HORTICULTURAL ABSTRACTS

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SALIENT ITEMS, Vol. 30, No. 2.

ENVIRONMENT

General:—The geographical area in which vegetables are grown may have a considerable effect upon their composition (2130, 2165, 2375).

Light:—The mineral metabolism of tea shoots can be changed by shading them individually without altering the illumination of the soil (2998).

Temperature:—In sugar cane carbohydrate translocation is more dependent on root temperature than on air temperature (2979). Colour differences in different parts of tomato fruits have been related to temperature gradients established across them (2373). The present world record in hardiness is believed to be held by some black currant cuttings which survived −253° C. (1824).

Water:—Formulae for potential evapo-transpiration deduced from herbaceous crops are applicable to apple trees in wet, but not in dry, summers (1684). In cherry fruits cracking can be reduced by measures that offset excessive absorption of water (1675). In grapes maturation is delayed if the mean R.H. is either above or below certain limits (1889).

Mulching:—Quick results need not be expected when pear orchards are mulched with straw (1680). For vegetables paper mulches, sometimes impregnated with herbicides, may be used, in which the seeds are sown through perforations (2089, 2142). Heavy aluminium foil, used for the same purpose, can be left in position for two or more seasons (2114).

Soil management:—Grassing down alternate inter-rows in orchards is apt to cause asymmetrical root development (1676). Soil compaction caused by heavy machinery may check root growth of some apple rootstocks but has little effect on others (1682).

Flower pots:—The physical and chemical properties of these humble but essential accessories are attracting attention (1574, 1575).

GROWTH PHENOMENA

Growth habit:—Apple seedlings with naturally spreading tops generally possess a higher yielding potential than seedlings with an upright growth habit (1702). By contrast, in grapevines any diversion of shoots from the vertical is apt to depress flower and fruit formation (1873).

Root growth:—The pattern of root growth of young apple seedlings differs from that of older seedlings and of clones (1711). The capacity of apple roots to regenerate following pruning declines as the season advances (1722). In walnuts most feeder roots are lost at leaf fall and new roots form before the leaves expand in the spring (1903).

Flower bud formation:—The terminology used to describe the stages of flower bud development remains vague. One author now recognizes 7 stages in the development of apple flower buds, although not all these stages can be recognized clearly in some varieties (1707). Another author distinguishes between "induction" and "initiation" in the strawberry and states that about 10 days usually separate the two processes (1814).

Pollen:—Variability in the size of pollen grains may be affected by plant nutrition (1499). Pollen colour and speed of germination may be related (1498). Onion pollen can be freeze-dried and stored in nitrogen gas for 2 months without loss of viability (1500). In guavas parthenocarpic fruits have been formed following treatment with extracts of crushed pollen (2906). In areca nuts pollen germination may be prevented by fungus spores adhering to the stigmas or it may be stimulated by a variety of compounds, including, for those who can afford it, gold chloride (2802, 2803).

Fruit development:—Most of the enlargement of apple, peach and cherry fruits occurs at night (1731). In grapes bunch form and fruit size will almost certainly be affected by gibberellic acid but not necessarily in the way desired (1859–1864). GA would also seem to be just the thing for anyone wishing to produce large yields of flavourless hops (2514).

Cuticles:—Further studies on the wax and cutin components of fruits and leaves (1700).

Tissue culture:—Of apple fruit tissues (3065).

Growth substances:—There is further evidence that certain alcohols found in plants possess growth-promoting activity (1553). An instance is recorded in which heteroauxin induced the formation of polyploid shoots in vines (1843).

Cautionary tales:—It has been demonstrated that a single drop of dilute 2,4-D can play Old Harry with the mineral composition of a plant (2208) and that a single application of one of the quaternary ammonium compounds that cause dwarfing in plants may retain its activity in the soil for more than 8 years (1564).

MACHINERY, BUILDINGS AND EQUIPMENT

Machines and implements:—For sorting and sowing seeds (1505, 2109), for planting trees and shrubs (1578, 1579), for bench-grafting vines (1849), for harvesting fruits and nuts (1746, 1828, 2769), cucumbers (2188) and tobacco (2449), for washing vegetables (2132, 2173, 2299) and for packing apples (1756).

Buildings and equipment for drying crops:—For seeds (1503, 1504), tobacco (2450–2452), coffee (2900, 2901) and cloves (3011).

Other buildings and equipment:—In addition to papers on greenhouses and their equipment (1593 *et seq.*) there is a book on the uses of polythene in greenhouses and elsewhere (3031). There are also papers on cold stores (1759–1761) and on a large-scale germinator for oil palm seeds (2928).

Practical devices:—These include nursery equipment (1576, 1577), wire braces to prevent branch breakage in fruit trees (1728), supports for runner beans (2204), ladders and platforms for picking fruit (1747) and a picking box for peaches (1752).

Research apparatus:—Another controlled-temperature chamber is mentioned (2656). Among other items are devices for measuring air and plant temperatures (1585, 1586), surface moisture (1931–1933), light intensity (1587) and the intensity of sandstorms (2361). For use in plant measurement there are a remote-reading dendrograph (1588), another device for determining the firmness of tomatoes (2374) and, almost inevitably, two more instruments for measuring leaf area (1589, 1590).

METHODS, PRACTICAL AND EXPERIMENTAL

Planting crops:—Coffee can be included among the perennial crops that rarely recover fully from mistakes made at planting (2878). The planting of tobacco by machine and by hand has been re-examined in terms of the human energy needed per plant (2398). The spacing used in citrus groves has also been re-examined in terms of annual yields per acre over a period of 49 years (2717).

Handling crops:—Apples are particularly well covered in papers on harvesting, packing and storage (1748, 1755, 1765, 1766, etc.).

Experimental techniques:—These include a staining technique for detecting and recording apple scab lesions (1572) and analytical procedures for herbicides and pesticides (1570, 1571).

NUTRITION

General:—The branching of pea roots is influenced by the concentrations of different ions in the soil (1526). In the different layers of soil under vines the conductivity of the soil solution varies with the concentration of feeder roots, and this makes it possible to locate the layers from which soil samples should be taken for analysis (1880).

N, P and K:—Comprehensive studies are reported on the N reserves of apple trees (1689) and on the physico-chemical properties of sugar cane sap as affected by N, P and K (2980). For onions the optimum ratio of the three elements alters as the plants develop (2280, 2282). With tobacco plants the need for applied N varies with the amount of water supplied (2410, 2411). Studies on tomatoes indicate that the adverse effects of providing all the N as ammonium are due to the absence of nitrate rather than to ammonium toxicity (2332). Studies on 4 woody species suggest that P fertilization affects leaf pigmentation in ways which increase the amount of light absorbed (1528). Finally, there is further evidence indicating that, when P^{32} is used in experiments, the radiation effects, as opposed to the effects of P, are such that they should not be ignored (1527).

Other elements:—In lemons Fe deficiency may inhibit chloroplast formation (2734), and in pears it results in chlorophyll breakdown under conditions of high light intensity (1692). In tomatoes root abnormalities caused by the chelate disodium versenate may result from a failure to incorporate Ca into the cell walls (2338).

PLANT PROTECTION

Fungi:—Agents that may encourage attacks by fungi include sandstorms and bugs (2361, 2832). Agents that may discourage attacks by soil organisms include crop residues possessing high C:N ratios (2213, 2215). One fungus attacking stone fruit trees secretes a toxin which alters the metabolism of the trees (1940); others cause indoleacetic acid to be produced in the trees (1942).

Viruses:—With tobacco the preceding crop may have a marked effect on the incidence of virus diseases (2386). Studies on soil-borne viruses support the view that an organism, possibly a nematode or a fungus, must be present for them to survive and invade plants (2358). To control apple mosaic it is now possible to apply heat treatment soon after healthy stocks have been budded with infected buds (1914).

Nematodes:—More on the marigold method of control (3004).

Insects and mites:—The latest results of investigations on the *Pseudotheraptus* bug of coconuts contain the seeds of an interesting controversy, which might suitably be headed "culture versus chemicals" (3040). In work on fruit flies a protein derived from fish (pilchards) has proved an effective and cheap attractant (1988, 1989, 2759). For spider mites the latest answer is polybutenes (1962).

Birds and beasts:—More good marks for woodpeckers (2002), and more black marks for starlings, which, however, find helicopters equipped with flashing lights disconcerting (2012). Plastics appear once again, this time as perforated sheaths to protect tree trunks from rabbits and hares (2013).

Pesticide problems:—Three papers describe some of the complications that are apt to follow the use of soil fumigants (2118, 2119, 2402). Studies on 61 surface-active agents used in sprays throw light on the physico-chemical characteristics that are responsible for phytotoxicity (2022). Studies on derris dusts show that reductions in particle size may increase their toxicity to insects (2221).

Weed control:—Soil moisture has been shown to have different effects on the activity of different herbicides (2033). Where herbicides are used among crops granular forms would appear generally to be safer than sprays (2044, 2047, 2094, 2095). The water hyacinth joins the list of weeds that may in future be exploited rather than annihilated (2038).

PROPAGATION

Seeds:—With several plants seed germination appears to be assisted by alternate wetting and drying (2104). With cyclamen it is affected by soil pH (2611). The presence of germinating seeds alters the catalase activity of the soil in their vicinity (1512).

Cuttings:—In rooting yew cuttings short photoperiods are beneficial, but only when the pH of the medium is relatively high (2676). By contrast, tea cuttings prefer a low pH but do not root well in soils from old tea gardens (2995). The discovery that holding bryophyllum and tomato plants horizontally encourages them to produce adventitious roots suggests that a study of the angle at which cuttings are inserted might be rewarding (1548).

Grafting:—Better, but fewer, unions in apples may follow the removal of the rind from scion whips (1658). A new method of double-working pear on quince in a single operation is described in 1660.

Stock-scion relationships:—In double-worked apples fruit colour can be influenced by the interstock (1659). In grafts between two papaw relatives incompatibility seems to be due to a substance produced by the male flowers of the scion that is toxic to the stock (2935).

MISCELLANEOUS

Vapours:—From carbolineum toxic to tomato seedlings raised in frames (2325).

Vintage wines:—For your chickens, naturally (1895)!

MISCELLANEOUS.

General.

1487. RIJKSTUINBOUWVOORLICHTINGSDIENST, 's-GRAVENHAGE.
Voordrachten gehouden op de Tuinbouwdagen te Wageningen op 20, 21 en 22 mei 1959. (**Papers read at the Horticultural Study Days held at Wageningen on 20, 21 and 22 May 1959.**) [English summaries.]
Meded. Dir. Tuinb., 1959, **22**: 467-590, illus.

This conference, held for the Dutch Horticultural Advisory Service, is in 3 sections, viz., *Research*, reviewing methods of scientific research; *Advisory work*, dealing mainly with the ethical problems of advisory work; and *Economics and Organization*, dealing with the production of vegetables and ornamental crops in the countries of the European Economic Community, and with work studies in horticulture.

1488. ÉCOLE NATIONALE D'AGRICULTURE D'ALGER.
Voyage d'Études en Israël de la Promotion 1955-1958 Mars-Avril 1958. (**Study tour in Israel in March/April 1958 by 1955/58 course students.**)
École Nationale d'Agriculture d'Alger, 1958, pp. 135, illus.

A factual and useful account of things seen in an extensive tour of the agricultural establishments in Israel from Acre to Beersheba and beyond. First the economic and social aspects of Israeli present-day agriculture are detailed. The work in the semi-arid zones and the efforts being made to supply water to these zones by harnessing the Yarkon and by other means are then outlined. Brief notes cover the different species of fruit trees being grown and the varieties used. Viticulture is dealt with more fully, and all aspects of this industry, which is expanding especially in the direction of table grape production, are dealt with.

1489. FJÄDERHANE, A. M.
Trädgårdsinventeringen i Skåne 1957. (**Horticulture in Skåne 1957.**)
Medd. Alnarpsinst. trädgårdsekon. Byrån **28**, 1958, pp. 69.

Horticultural statistics.

1490. JAŠA, B.
Dnešní úsilí o zlepšení zelinářstvi, ovocnictví a vinařství v Bulharsku. (**The present endeavour to improve vegetable, fruit and vine growing in Bulgaria.**)
Acta Univ. Agric. Silvic., Brno, Ser. A, 1958, No. 4, pp. 455-60, illus.

1491. AMICO, A.
Cenni storici dell'Orto Botanico in Bari. (**Historical notes on the Bari Botanic Garden.**)
Nuovo G. bot. ital., 1958, **65**: 363-9, bibl. 14, illus.

1492. WEST, E.
Poisonous plants around the home.
Circ. Fla agric. Exp. Stats **S-100**, 1957, pp. 38, illus., [received 1959].

Recognition and toxicity of poisonous ornamentals and garden weeds.

Climate and air pollution.

(*See also* 1580, 1824.)

1493. HUDSON, J. P.
Plants and the weather.
J. roy. hort. Soc., 1959, **84**: 443-56, 509-24, bibl. 16, illus.

The Masters Memorial lecture, covering weather and yields, plant micro-climate, the importance of water, the modification of plant environment, and the use of growth substances to alter the reaction of the plant to its environment. [See also *H.A.*, 29: 6 and 3118.]

1494. SHEPHERD, F. W.
Shelter for horticultural crops.
Agriculture, Lond., 1959, **66**: 231-5, illus.

The damaging effect of the turbulence produced by solid barriers is stressed; the optimum shelter is given by a barrier of 60% solid to 40% aperture. Although some protection is afforded to plants situated at a distance to leeward of up to 20 times the height of the shelter, 10 times the height is regarded as the maximum effective distance and 5–7 times the ideal. Permanent shelter belts running north to south are recommended, with temporary east to west barriers to protect delicate plants as required.—Rosewarne exp. Hort. Stat.

1495. BALDACCI, E., AND CECCARELLI, V.
L'inquinamento atmosferico e le piante. (**Atmospheric pollution and plants.**) [French, English and German summaries approx. ½ p. each.]
Reprinted from *Chim. Industr.*, 1958, **40**: 274 *et seq.* (pp. 24), bibl. 19.

Conditions for the successful use of plants as indicators of atmospheric pollution are discussed. The sensitivities of 43 woody and 40 herbaceous plants (edible and ornamental) to sulphur dioxide, sulphur trioxide, chlorine, hydrogen chloride, fluorine, hydrogen fluoride and ammonia are tabulated.

1496. BABKINA, V. M.
The resistance of ornamental plants to flue gases. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 33, pp. 48-52, bibl. 6.

The leaves of plants affected by acid flue gases exhibit brown, white or dark red necrotic spots. The gas-resistance of the leaves decreases with age. The greatest damage from gas occurs in hot weather vith intermittent rainfall. Plants grown for a ong period in a polluted atmosphere acquire a neasure of resistance, which is transmitted to the ubsequent generations.

497. LEDBETTER, M. C., ZIMMERMAN, P. W., AND HITCHCOCK, A. E.
The histopathological effects of ozone on plant foliage.
Contr. Boyce Thompson Inst., 1959, **20**: 275-82, bibl. 22, illus.

Young plants of 32 species and varieties growing n a greenhouse were exposed to 0·1–1·0 p.p.m. concentrations of ozone in a circulating stream of vashed air. In descending order of susceptibility he [horticultural] plants were tomato, Pinto bean, Maryland Mammoth tobacco, spinach, Vamorr 48 obacco, Pippin chrysanthemum, Turkish tobacco, *Mimosa pudica*, grape, verbena, chrysanthemum, *Solanum pseudo-capsicum*, avocado, strawberry, *Mentha piperita* and geranium. Gladiolus, kalanchoe, *Capsicum frutescens* and Tendergreen bean were not visibly injured. Injury appeared in varyng amounts as dark stipples, light flecks, necrotic patches and general chlorosis. Dark punctate markings were shown to be due to pigmentation nd thickening of cell walls in the palisade area, ight-coloured flecks were associated with a collapse of the palisade cells without pigment formation, nd necrotic areas were found to consist of general njury to all cells between and including the epidermis. Very young leaves that had no functional tomata were, in general, resistant to ozone. In variegated coleus injury was largely associated with he pigmented sectors. [From authors' summary.]

Pollen.

(*See also* 2507, 2802, 2803, 2906, 2918.)

498. POLUNINA, N. N.
The relationship between the colour of pollen and the rate of growth of the pollen tube. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 33, pp. 67-8, bibl. 5.

The orange pollen of *Feijoa sellowiana* germinated well on artificial media, and pollen tubes appeared within 1–1½ hours, attaining a length of 600–650 μ within 24 hours. The orange-yellow pollen of *Callistemon lanceolatus* also germinated well, but he pollen tubes grew more slowly and reached only 00–350 μ in 24 hours. The pale yellow pollen of *Eucalyptus* started germinating only after 3–4 hours, nd the pollen tubes reached only 150–200 μ in 4 hours. The almost white pollen of *Eugenia myrtifolia* germinated poorly, and only when ucrose was added to the medium did it start growing after 5–6 hours; the pollen tubes reached only 80–110 μ in 24 hours. The presence of carotene and carotenoids in the orange and yellow-orange pollens supports the supposition that carotene greatly stimulates pollen germination.

1499. BELL, C. R.
Mineral nutrition and flower to flower pollen size variation.
Amer. J. Bot., 1959, **46**: 621-4, bibl. 16.

Clonal cuttings of tomato and petunia (*P. hybrida*), and seedlings of dill (*Anethum graveolens*) and portulaca (*P. grandiflora*) were grown in complete and in 6 different nutrient-deficient solutions, each lacking one of the elements N, K, P, Ca, Mg and S. Mineral nutrition appeared to affect the amount of pollen size variability in both the clonal and seedling material. In no case did the controls have the largest mean pollen size, but no size pattern related to blooming date or specific deficiency was detected. In one petunia clone the largest pollen was produced in a —N solution and in another clone in a —K solution. Also in petunia there was greater variation between flowers on the same plant than between flowers from different plants of the same clone in different nutrient solutions. The danger of using pollen size as an indicator of polyploidy or as a taxonomic characteristic is stressed.—Univ. N.C., Chapel Hill.

1500. (KING, J. R.)
Pollen preservation.
Amer. Fruit Gr, 1960, **80**(1): 51.

Onion pollen was freeze-dried, sealed in nitrogen gas and stored for 2 months without loss of viability. Pollen preservation could prove valuable in the artificial pollination of fruit trees.

1501. POLUNINA, N. N., AND SVEŠNIKOV, A. I.
Microfilming in the study of the pollen and pollen tubes of certain Amaryllidaceae. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **127**: 217-19, bibl. 8, illus.

The use of high speed apparatus for studies on pollen tube growth in an *Amaryllis* hybrid, *Clivia miniata* and *Crinum abyssinicum*.

1502. WOLFENBARGER, D. O.
Dispersion of small organisms. Incidence of viruses and pollen; dispersion of fungus spores and insects.
Lloydia, 1959, **22**: 1-106, bibl. pp. 7.

A review of the literature.

Seeds.

(*See also* 1639, 1641-1646, 1715, 1848, 2101, 2103-2107, 2119, 2166, 2170, 2211, 2223, 2252-2254, 2314, 2393, 2394, 2470, 2500, 2533, 2611, 2625, 2645, 2808, 2826, 2927, 2928, 2994.)

1503. (PELLIZZI, G.)
Macchine nella produzione e per l'impiego delle sementi. **(Machines in the production and handling of seeds.)**
Sementi elette, 1959, **5**(4): 77-8.

Brief descriptions of an American seed-drying machine and a British seed-counting machine, and various types of drier compared.

1504. Hart, J. R., Feinstein, L., and Golumbic, C.

Oven methods for precise measurement of moisture content of seeds.

Mktg Res. Rep. U.S. Dep. Agric. **304**, 1959, pp. 16, bibl. 8.

Air-oven procedures have been standardized against established methods to determine the moisture content of 32 agricultural and vegetable seeds. The times and temperatures required for heating seeds of each species are tabulated.

1505. Slobodjanik, N. I.

Sorting seeds by specific gravity. [Russian.]

Sad i Ogorod, 1959, No. 12, pp. 13-16, illus.

A pneumatic machine is described by which seeds were graded by weight. With carrot seed the lighter fractions contained more impurities, did not germinate so well and produced smaller roots than the heavier fractions.

1506. Maguire, J. D., and Overland, A.

Laboratory germination of seeds of weedy and native plants.

Stats Circ. Wash. St. agric. Exp. Stats **349**, 1959, pp. 15.

Seeds from 250 species were tested under different conditions. The species of Cruciferae, Hydrophyllaceae and most of the Caryophyllaceae germinated well under all light and temperature conditions. Poor germination results were obtained with most of the Boraginaceae, Rosaceae and Umbelliferae. The other families showed variable germination. Many of the Compositae showed primary dormancy. Species of Amaranthaceae were insensitive to light and germinated best with alternating 20–30° C. temperatures. Scrophulariaceae also showed a preference for alternating 20–30° C. temperatures. Most species of Labiatae, Solanaceae, Polygonaceae and Chenopodiaceae showed some germination under all temperature and light conditions. Species that showed less than 40% germination were given cold treatment at 3° C. for periods of 1, 2, 3 and 4 weeks to overcome dormancy, and this treatment was successful in several cases. [From authors' summary.]

1507. Heaslip, M. B.

Effects of seed irradiation on germination and seedling growth of certain deciduous trees.

Ecology, 1959, **40**: 383-8, bibl. 5.

Effects of irradiation with acute doses of cobalt-60 gamma rays on dormant seeds of 18 species, including *Acer saccharum*, *Juglans nigra* and some ornamental trees, are recorded. Germination, seedling growth and survival were affected according to species. Critical levels of irradiation were found to be much lower after dormancy had been broken.

1508. Ballard, L. A. T., and Lipp, A. E. G.

Differential specificity exhibited by two germination inhibitors present in *Echium plantagineum* L.

Aust. J. biol. Sci., 1959, **12**: 343-7, bibl. 11.

Water and alcohol fractions of an *Echium* extract each differentially inhibited germination of seeds of a number of plants, including cucumber, brassicas, tomato, onion, carrot and lettuce.

1509. Halweg, H., and Krakówka, P.

Inhibition of germination of seeds by salicylhydroxamic acid (T2) and 5-bromosalicylhydroxamic acid (T40). [In English.]

Bull. Acad. polon. Sci. chim., 1959, **7**: 143-6, bibl. 11, from abstr. in *J. Sci. Food Agric.*, 1960, **11**: i-10.

The effects of T2 and T40 on the germination of vegetable, flower and cereal seeds were studied. Both acids inhibited the germination and growth of most of the tested plants. The minimum inhibitory concentration of T2 and T40 was 15–62·5 µg. per 1 ml. of medium. Apart from these results, the compounds had a stimulating effect on the germination of peas and tomatoes.

1510. Lebedev, G. V.

The rate of exchange of water in turgid plant seeds. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1959, **128**: 632-4, bibl. 8.

Marrow and broad bean seeds, soaked in water containing 4·9% of heavy water and then leached in plain water, were used in experiments to compare the rate of water exchange in living seeds and in seeds killed at 112° C. Marrow seeds exchanged D_2O more rapidly than bean seeds. Dead bean seeds exchanged D_2O more rapidly than living ones, but there was little difference between dead and living marrow seeds. At this concentration D_2O was not toxic.

1511. Wager, H. G.

The effect of artificial wilting on the production of ethanol by ripening pea seeds.

New Phytol., 1959, **58**: 68-74, bibl. 9.

Under anaerobic conditions the rate of ethanol production changed little with time. The carbon dioxide in excess of that equivalent to ethanol changed greatly, especially during the first 4 hours of anaerobiosis, and was much less in peas artificially wilted to about 70% in weight. The ethanol formed while the peas were kept under anaerobic conditions was not significantly metabolized on their return to air. [From author's summary. For C_2O production see *H.A.*, 28: 1435.]—Low Temp. Stat., Cambridge, and D.S.I.R.

1512. Verona, P. L.
L'attività catalasica del terreno in funzione dell'effetto-seme. **(The catalase activity of the soil as related to the presence of seeds.)** [English summary 6 lines.]
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 288-94, bibl. 4.

Experiments with seeds of 6 species, each sown in 3 different kinds of soil, showed significant increases of catalase activity in the "spermosphere" region, i.e. in soil close to the seeds. Turnip and lupin seeds were included.

1513. Smith, C. R., Jr., and others.
Seed protein sources—amino acid composition and total protein content of various plant seeds.
Econ. Bot., 1959, **13**: 132-50, bibl. 72.

A review, with tabulated data covering 89 species from 25 families.

Propagation methods and media.

(*See also* 1574-1576, 2513, 2589.)

1514. Argles, G. K.
Root formation and root development in stem cuttings: a re-examination of certain fundamental aspects.
From abstr. in *Ann. appl. Biol.*, 1959, **47**: 626-7.

From a re-examination of the literature the author attempts: (1) to define more precisely the stages involved in the rooting of stem cuttings; (2) to determine the extent to which the capacity of a stem to form roots shows periodicity associated with the successive growth stages of the source plant; (3) to examine ways in which the rooting environment can be regulated to encourage survival, root formation and root development; and (4) to indicate certain future lines of investigation which might lead to a better understanding of the processes involved in regeneration.—Commonw. Bur. Hort. Plant. Crops, E. Malling.

1515. Miles, H. W., and Sykes, J. T. (Editors).
Mist propagation.
* [*Mimeo.*] *Proc. Conf. Dep. Hort., Wye Coll., Kent, 15 Dec., 1958*, 1959, pp. 56, bibls, 3s. 6d.

Summaries are given of the following papers read at this conference on mist propagation equipment and techniques: Definition of terms, by A. W. Gray; Mist installations, by F. H. Vanstone; Control mechanisms, by R. C. Frampton; Supplementary equipment, by D. B. Lowndes; Housing mist propagation units, by E. E. Kemp; The place and management of mist propagation in nursery practice, by E. C. Cordell; Problems arising from the propagation of plant material in a controlled environment, by I. H. Williams; Methods of extending the season of propagation of woody plants, by E. E. Emerson; Response of soft-wood cuttings to mist, by F. W. Shepherd; Mist propagation at Wisley, by P. J. Dykes; Fruit tree propagation under mist out of doors, by E. S. J. Hatcher; Factors affecting cutting response to mist, by J. T. Sykes. Discussion on the papers and observations submitted by a few nurserymen are also included in the report. [It is hoped to provide abstracts of some of the individual papers in the next number of *H.A.*]

1516. Vanstone, F. H.
Equipment for mist propagation developed at the N.I.A.E.
From abstr. in *Ann. appl. Biol.*, 1959, **47**: 627-31.

The design of the sensing element or artificial leaf is discussed. A porous surface was more sensitive than a continuous surface, and a filter-paper bridge between the 2 platinum electrodes was adopted. The control unit was designed to avoid excessive watering by allowing only short, 1-sec., bursts, which are repeated as necessary. The design of the solenoid valve and nozzles is discussed. Among nozzles, fan-type ceramic jets with elongated orifices and a droplet spectrum with a M.M.D. of 200 μ are preferred. The performance of this system and recent developments are described.—N.I.A.E., Silsoe.

1517. Tureckaja, R. H.
The use of growth substances in the propagation of top- and small-fruit, forest and ornamental plants by cuttings. [Russian, with English summary ⅓ p.]
Fiziol. Rast., 1959, **6**: 494-9, bibl. 35, illus.

A review giving compounds and rates used and species treated.

1518. Sutton, P. J.
A review of the literature relating to standard seed and potting composts.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 69-78, bibl. 54.

1519. Henze, —.
Herstellung und Nährstoffgehalt von Kompost. **(Preparation and nutrient content of compost.)**
Gartenwelt, 1959, **59**: 383-4.

Analyses of 73 organic composts for P and K contents and of 63 composts for N content; pH values also recorded.

1520. Slade, D. A.
N.Z. peats suitable in composts and rooting media.
N.Z. J. Agric., 1959, **99**: 287, illus.

Peats from 3 out of 4 different sources in New Zealand, when used in nursery compost and rooting media, compared favourably with peat imported from Cumberland, England.—Levin. hort. Res. Stat.

1521. Matthews, J. W.
Pumice enters horticultural field.
N.Z. Gdnr, 1959, **16**: 11-12.

Promising as a medium for rooting cuttings and raising seedlings and for addition to potting soils.

Irrigation.

(*See also* 2343.)

1522. Renouf, L. R.
Irrigation of horticultural crops.
Fruit and Prod., August, 1959, pp. 12-15, September, 1959, pp. 10-12, and October, 1959, pp. 12-15, illus.

Subjects discussed include: frequency and rate of irrigation, water measurement and methods of irrigation, viz. (1) furrow, including layout, spacing and grading, (2) border dike and (3) sprinkler, including layout, pumping plant, pipelines, types and spacing of nozzles and spray heads, the use of strainers, labour requirements and costs.

1523. Arvo, V.
Irrigazione meccanica. **(Mechanized irrigation.)**
Progr. agric., 1959, **5**: 1277-89, illus.

Data for Italy and the other 5 countries of the European Common Market.

1524. Matthews, C. D.
Water storage for orchard irrigation.
Tasm. J. Agric., 1959, **30**: 220-30, bibl. 6, illus.

Planning and construction of tank and dam storage.

1525. Bloom, A.
Sub-irrigation is especially valuable in small gardens.
Gdnrs' Chron., 1960, **147**: 3, 14, illus.

Directions for laying the pipes.

Nutrition and plant composition.

(*See also* 1569, 1700, 3026, 3027.)

1526. Wiersum, L. K.
Density of root branching as affected by substrate and separate ions.
Acta bot. neerl., 1958, **7**: 174-90, bibl. 58, illus.

An experimental technique is described, by means of which it has been demonstrated that peat and clay colloids in the soil stimulate the out-growth of many laterals from pea roots. The relative effectiveness of single ions in inducing branching was $NO_3 > H_2PO_4 = K > Ca = Mg > SO_4$. In a N-deficient solution the roots were long, with few branches; in a P-deficient solution there was a tendency for less growth in length and more lateral formation, similar to the effect of high N. The results suggested that neither Ca nor Mg have much influence on branching. The effect of peat and clay in these experiments could be attributed to the high ionic concentrations of the adsorbed ions.—Inst. Soil Fert., Groningen.

1527. Marais, P. G., and Fourie, S.
Radiation effects on the growth and phosphorus uptake of plants grown in soil treated with P^{32}. [Afrikaans and French summaries ½ p. each.]
S. Afr. J. agric. Sci., 1959, **2**: 3-18, bibl. 19, illus.

In soil culture studies with various levels of P^{32} differences in dry weight and P content of 15% or more were not uncommon between treated and control tomato plants. The radiation effects were mainly stimulative, but did not vary directly with increasing levels of P^{32}; they depended on the species and age of the plant and the soil in which it was grown. There was a differential effect of P^{32} on the tops and the roots, and also on the dry weights and P contents of the plants. Radiation from P^{32} also had a highly significant effect on the Ca uptake by plant tops. The magnitude of the radiation effects was such as to suggest that they cannot be ignored.—W. Prov. Fruit Res. Stat., Stellenbosch.

1528. Dadykin, V. P., Vedenko, V. P., and Davydova, Ju. A.
The optical qualities of leaves in relation to soil fertilization. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **128**: 1305-8, bibl. 13.

A study of 4 woody species, including *Malus sylvestris* and *Corylus avellana*, showed that with increased P fertilization the pigmentation of the leaves was altered in a way that reduced the percentage of the incident light reflected and transmitted, i.e. the percentage of the light absorbed was increased.

1529. Sen, A., and Paul, N. B.
Occurrence of a phosphorbacterium in the glands of *Cassia occidentalis*.
Indian J. agric. Sci., 1958, **28**: 21-9, bibl 4, illus., [received 1959].

Found in the petiole glands, this organism produces soluble P from insoluble sources in the presence of N.

1530. Dale, J. E., and Sutcliffe, J. F.
The effects of aqueous extracts of red beet root on salt accumulations and respiration of discs of red beet root.
Ann. Bot. Lond., 1959, **23**: 1-21, bibl. 30.

An account is given of the preparation of aqueous extracts of red beet root, which are shown to stimulate K uptake in beet discs washed for a short period, but inhibit K uptake in discs washed for 4 days or more. Analysis of extracts showed them to contain organic anions (especially citrate and malate) which affect both the metabolic phase of K uptake and respiration of the tissue. The effects of extracts and organic acids on uptake of Mn by beet discs is described and compared with effects on K absorption. The results are discussed with respect to current theories of salt accumulation and in relation to the hypothesis relating an inhibitor of salt accumulation to the lag phase of ion uptake by beet discs. [Authors' abstract.]—King's Coll., Lond.

1531. FOWLER, E. B., AND CHRISTENSON, C. W.
Factors affecting uptake of radioactive cesium by lettuce, grass, and alfalfa.
J. agric. Food Chem., 1959, **7**: 847-9, bibl. 7.

Caesium-137 forms about 6% of the products released on fission. Factors affecting its uptake from soil are reported. Potassium fertilizers may decrease the caesium-137/potassium ratio in the plant but may also make caesium more available in some soils.

1532. GULJAKIN, I. V., AND OTHERS.
Investigation on the relationship between strontium-90 and calcium in soils and plants. [Russian, with English summary 10 lines.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 5, pp. 29-46, bibl. 13.

Peas and red beet were included in experiments to compare the uptake of Sr^{90} and Ca from different types of soil with a range of contents of these elements. Sr uptake was directly related to the Sr content in the soil, whereas Ca uptake was nearly constant over a wide range of soil Ca contents. Different amounts of Sr^{90} were accumulated by different plants or parts of plants growing in the same soil, but the Sr^{90} : Ca ratio was constant.

1533. TUKEY, H. B., JR., AND ROMBERGER, J. A.
The nature of substances leached from foliage.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): vi.

Analyses of the organic constituents of leachates of young bean (*P. vulgaris*) leaves have shown numerous common carboxylic acids, amino acids and sugars to be present in appreciable quantities.—Calif. Inst. Tech., Pasadena.

1534. ANDREWS, P., HOUGH, L., AND STACEY, B.
Polysaccharide composition of leaves.
Nature, 1960, **185**: 166-7, bibl. 4.

Including apple, pear, plum [see also *H.A.*, 29: 1157], gooseberry, beans, castor, mint, sage and certain ornamentals.

1535. UNDENFRIEND, S., LOVENBERG, W., AND SJOERDSMA, A.
Physiologically active amines in common fruits and vegetables.
Arch. Biochem. Biophys., 1959, **85**: 487-90, bibl. 10.

Figures for banana, tomato, plum, avocado, spinach, grape, orange and eggplant.

1536. DAGIS, I. K.
Vitamins of the bios group in the flowers, fruits and seeds of some plants. [Russian, with English summary ½ p.]
Fiziol. Rast., 1959, **6**: 421-8, bibl. 11.

Bios [a mixture including B_1] concentrations in the reproductive and vegetative organs were compared, and variations in the content of the reproductive organs during development were studied. Bios concentrations were found to be higher in the inflorescences than in the leaf buds of several trees, including *Corylus avellana* and *Malus communis.* In *Nicotiana longiflora* and *Petunia violacea* a movement from the perianth into the stamens and pistils was detected. The fleshy fruits of blueberry, strawberry, raspberry and black currant showed a high concentration at the beginning of development, followed by a fall and then an increase until the end of the ripening period. In bean and pea seeds two maxima also occurred, one during the embryonic growth and the other during germination. In germinating bean seeds the highest bios content occurred in the embryos and the concentration was also high in the cotyledons.

Soilless culture.

(*See also* 2180, 3019.)

1537. CALZECCHI-ONESTI, F.
La coltura idroponica è una cosa seria. **(Hydroponic culture is something to be taken seriously.)**
Ital. agric., 1960, **97**: 57-65, bibl. 27, illus.

A review of methods, installations and successes with tomato growing in the Albenga district of Italy.

1538. FLORENZANO, G.
Prime ricerche in Italia, nell'impianto sperimentale di Firenze, sulla coltura massiva non sterile di alghe. **(The first studies in Italy, with the Florence experimental plant, of large-scale non-sterile cultivation of algae.)** [English summary ¼ p.]
Nuovo G. bot. ital., 1958, **65**: 1-15, bibl. 2, illus.

Species of *Chlorella* and *Scenedesmus* have been grown on a large scale, and samples of flour with a high vitamin content have been prepared from them. The installations are described and clearly illustrated. The harvested product is dried by infra-red radiation and eventually powdered. The account refers briefly to the use of purified sewage water for algal culture and to the cultivation of N-fixing forms such as *Anabaena* and *Nostoc* for fertilizers and fodder.

1539. Flaig, W.
Sobre la formación del humus y su influencia sobre el crecimiento de las plantas. (**The formation of humus and its effect on plant growth.**)
An. Edafol. Fisiol. veg., 1959, **18**: 505-39, bibl. 112, illus.

Including the effects of thymohydroquinone on the organic-acid metabolism of runner bean seedlings in culture solution.

Tissue culture.

(*See also* 1558, 2347, 2418, 2590, 2608, 2800, 2809, 3065.)

1540. Navarro, A. F.
Cultura de tecidos vegetais. Sua importância no estudo biológico de algumas hiperplasias. (**Plant tissue culture. Its importance in the study of some types of hyperplasia.**) [English summary ½ p.]
An. Inst. sup. Agron. Lisboa, 1955-1958, **22**: 239-48, bibl. 18, illus.

With special reference to crown gall (*Agrobacterium tumefaciens*).

1541. Sheat, D. E. G., Fletcher, B. H., and Street, H. E.
Studies on the growth of excised roots. VIII. The growth of excised tomato roots supplied with various inorganic sources of nitrogen.
Hannay, J. W., Fletcher, B. H., and Street, H. E.
Idem. IX. The effects of other nutrient ions upon the growth of excised tomato roots supplied with various nitrogen sources.
New Phytol., 1959, **58**: 128-41, bibl. 21, and 142-54, bibl. 16.

Physiology and metabolism.

(*See also* 1552, 2110, 2206, 2207, 2234, 2237, 2238, 2641, 3020.)

1542. Tukey, H. B., Jr., and Ketellapper, H. J.
The effect of temperature and length of the light-dark cycle on plant growth.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): iv.

Seeds of tomatoes and peas were germinated and grown initially at constant temperatures in either continuous light or a normal 24-hour light-dark cycle. The conditions under which the plants were germinated and grown prior to exposure to the experimental conditions did not affect the results qualitatively. A study of photosynthesis, respiration and stem elongation has not revealed an inherent rhythm, the pattern being similar under all temperature and cycle conditions, although the rates differed.—Calif. Inst. Tech., Pasadena.

1543. Wellensiek, S. J.
The inhibitory action of light on the floral induction of *Perilla crispa*.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1959, **62**: 195-203, bibl. 6, illus.

Experiments on the short-day plant *Perilla crispa* showed that light exerts an inhibitory action on floral induction and darkness removes this inhibition. The relative durations of light and darkness determine whether the inhibitory effect of light is removed completely, so that flower induction can take place. Periodical night breaks had an effect similar to, but quantitatively much smaller than, continuous light. Light inhibition, which reached a maximum after 3 days' continuous light, took place with all the sources of light studied. [For earlier work see *H.A.*, 29: 3134.]

1544. Litvin, F. F., Krasnovskij, A. A., and Rihireva, G. T.
Formation and transformation of protochlorophyll in green leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **127**: 699-701, bibl. 8.

An intermediate product in the transformation of protochlorophyll to chlorophyll was shown to occur in etiolated bean leaves in the first minutes of illumination. The intermediate product showed maximum fluorescence at 690 mμ.

1545. Meijer, G.
Influence of light on the elongation of gherkin seedlings.
Acta bot. neerl., 1958, **7**: 614-20, bibl. 9.

The response of gherkin seedlings to light of different colours differed according to whether germination took place in white light or in darkness. Red and green light appeared to inhibit internode elongation of light-germinated seedlings, while blue light had an elongating effect. Elongation of seedlings germinated in the dark was inhibited by red and blue light.—N. V. Philips' Gloeilampenfabr., Eindhoven.

1546. Meijer, G.
The influence of light and of growth regulators on the elongation of gherkin seedlings.
Acta bot. neerl., 1958, **7**: 621-6, bibl. 5, illus.

The elongation in blue light of light-germinated gherkin seedlings [see preceding abstract] was also obtained in red light in the presence of IAA, tryptophol, tryptamine or indole-pyruvic acid. The blue-light elongation in these seedlings was cancelled by the anti-auxins pentachlorophenoxyacetic acid and coumarin. Pre-treatment of light-grown seedlings with blue or infra-red radiation for 16 hours before placing them in darkness had a toxic effect, as also had pre-treatment with a combination of red light and auxins. Plants pretreated with red light without the application of auxins showed no toxicity symptoms.—N. V. Philips' Gloeilampenfabr., Eindhoven.

1547. Thomson, B. F.
Far red reversal of internode-stimulating effect of red light on peas.
Amer. J. Bot., 1959, **46**: 740-2, bibl. 6.

Irradiation with red light accelerates the elongation of extremely young pea internodes, reduces the elongation of partly elongated internodes, and has a little of both effects on internodes of intermediate ages. All of these effects are reversed by far red irradiation. The possible nature of the accelerating effect is discussed. [Author's abstract.]—Conn. Coll., New London.

1548. Bleasdale, J. K. A.
Gravimorphism and root formation.
Nature, 1960, **185**: 544-5, bibl. 6, illus.

Plants of *Bryophyllum daigremontianum* and tomato maintained in a horizontal position produced roots from the undersides of stem internodes, initials appearing in 2–3 and 4–5 weeks, respectively. Similar plants in a vertical position or rotated horizontally on a klinostat did not respond in this way.—Nat. Veg. Res. Stat., Wellesbourne.

1549. Hvedelidze, M. A.
Periodic variation of bioelectrical potentials in tradescantia. [Russian, with English summary 10 lines.]
Fiziol. Rast., 1959, **6**: 415-20, bibl. 20.

Rhythmical oscillations of the bioelectric potentials and their mean values have been observed in *Tradescantia zebrina* during spring growth, with amplitudes as great as 10-20 m.v. and frequencies as high as 100 cycles per hour. They showed pronounced diurnal variations between 11 a.m. and 1 p.m. and again from 6 to 11 p.m.

1550. Holm-Hansen, O., and others.
Uptake and distribution of radioactive carbon from labelled substrates by various cellular components of spinach leaves.
Physiol. Plant., 1959, **12**: 475-501, bibl. 46, illus.

Cellular constituents (chloroplasts, sap and mitochondria), separated from spinach leaves, were allowed to photosynthesize in the presence of radioactive bicarbonate. The radiocarbon fixed by the chloroplasts was distributed mainly in the phosphate esters while the radiocarbon fixed by the sap was located mostly in the amino acids. The mitochondrial fraction fixed very little radioactive carbon dioxide. The rate of carbon dioxide fixation by the recombined mixture of sap and chloroplasts was greater than the sum of the separated components. The distribution pattern of the fixed radiocarbon of the recombined mixture, however, was qualitatively similar to a combination of the radiocarbon distribution of the separated chloroplasts and sap. The results of experiments carried out with these cellular constituents in the dark and in the presence of other substrates, labelled and unlabelled, are discussed. [Authors' summary.]—Univ. Calif., Berkeley.

1551. Booth, V. H.
Inactivity of the carotene-oxidising system in iris leaf.
J. Sci. Food Agric., 1960, **11**: 8-13, bibl. 8.

In 20 species of plants examined enzyme activity occurred which destroyed a quarter of the carotene in pulped leaves in about 13 min. at room temperature. This enzyme was present in all green parts but not in chlorophyll-free tissue. As an exception carotene was found to be stable in macerated iris leaf.—Dunn. nutrit. Lab., Cambridge.

Growth substances.

(*See also* 1493, 1517, 1546, 1642-1644, 1649, 1650, 1715, 1730, 1736-1738, 1815-1817, 1843, 1859-1864, 1925, 2016, 2046, 2183, 2188, 2206-2209, 2239, 2240, 2254, 2255, 2300, 2306, 2349, 2350, 2418, 2419, 2488, 2491, 2506, 2514, 2519, 2522, 2542, 2552, 2569, 2586, 2600, 2608, 2628, 2636, 2642, 2643, 2802, 2812, 2819, 2872, 2916, 2948.)

1552. Choudhri, R. S.
Our concept regarding the possible significance of photoperiod and hormones in sex-expression and sex-reversal in plants.
Indian J. Hort., 1957, **14**: 179-84, bibl. 7, [received 1959].

The existence of 2 light-sensitive hormones or catalytic agents is suggested; the production and accumulation of these is favoured by different photoperiodic conditions, following which either staminate or pistillate flowers are produced.—Banaras Hindu Univ., U.P.

1553. Crosby, D. G., and Vlitos, A. J.
Growth substances from Maryland Mammoth tobacco: long chain alcohols.
Contr. Boyce Thompson Inst., 1959, **20**: 283-92, bibl. 10.

A growth-promoting fraction, isolated from an alcoholic extract of leaves and apical tissue by means of paper chromatography, was shown to have properties characteristic of long-chain primary alcohols containing between 22 and 28 C atoms. Bioassay of a wide variety of natural and synthetic long-chain compounds by the oat first-internode method has revealed that a number of C_{17} to C_{22} alcohols and their acidic inorganic esters exhibit growth-promoting activity. It is suggested that the present concepts of hormonal regulation of cell extension may be inadequate. [From authors' summary.]

1554. Alghisi, P., and Ghillini, C. A.
Modificazioni del metabolismo indotte dal 2,4-D nel fagiolo. (**Changes in bean metabolism induced by 2,4-D.**) [English summary ½ p.]
Not. Mal. Piante, 1959, No. 49/50, pp. 106-25, bibl. 43.

The effects depended on concentration. [For structural effects see *H.A.*, 28: 1443.]

1555. Appalanaidu, B.
Studies on the effects of 2-4-dichlorophenoxyacetic acid on *Brassica kaber* D.C., *Hibiscus esculentus* L., and *Helianthus annuus* L.
Diss. Abstr., 1959, **20**: 858, being *L.C. Card No. Mic.* 59-2989 of 219 pp.

Morphological and histological effects of sprays and injections of 2,4-D at concentrations ranging from 100 to 5,000 p.p.m. are described. *Brassica kaber* responded slowly, except at high dosages, but even the lowest dose proved lethal, death following peculiar hypertrophy of cambial and parenchymatous cells. Okra responded rapidly, the floral organs becoming abnormal and roots developing from internal stem tissues. In both species the leaf petioles became twisted and the blades epinastic. The growth of axillary buds was inhibited by injecting 2,4-D into decapitated stems.

1556. Nikolaevskij, V. G.
The herbicide 2,4-D and nastic movement. [Russian.]
Priroda, 1959, **48**(10): 110, illus.

When seedlings of thornless gleditschia were sprayed with 2,4-D at 1,000 p.p.m. the leaflets remained expanded during the following night. During the next few days petiole and stem curvature was observed, and the leaflets drooped and remained closed.

1557. Gundersen, K.
Some experiments with gibberellic acid.
Acta Hort. gotoburg., 1959, **22**: 87-110, bibl. 21, illus.

Gibberellic acid (10 or 100 p.p.m.) applied to dormant rhizomes of *Anemone nemorosa* was effective in breaking dormancy. Dormant pseudobulbs of *Pleione limprichtii* or *Begonia josephi* did not respond to GA treatment. GA promoted elongation of begonia stems (*B. semperflorens* × *B. fuchsioides*) partly by cell wall elongation, and partly by acceleration of cell division; cambial activity was also accelerated, the development of lateral branches was depressed and flowering was inhibited. Root growth of *Sinapis alba* seedlings was unaffected by GA treatment, but root formation in *Salix purpurea* was considerably depressed. —Bot. Inst., Univ. Gothenburg.

1558. Pecket, R. C.
Effects of gibberellic acid on excised pea roots.
Nature, 1960, **185**: 114-15, bibl. 3.

GA at 0·5 and 25 mg./l. caused small increases in the growth of excised roots of one pea variety but not of another variety. Root hair development was strikingly stimulated in both varieties.—Univ. Manchester.

1559. Frankland, B., and Wareing, P. F.
Effect of gibberellic acid on hypocotyl growth of lettuce seedlings.
Nature, 1960, **185**: 255-6, bibl. 9.

It is suggested that the elongation of the lettuce hypocotyl provides a useful method of bio-assay for gibberellin-like activity. In the experiment described GA had a significant effect at concentrations of 0·1 mg./l. and above; growth at 100 mg./l. was almost as great as the growth of untreated seedlings in the dark. There was a linear relationship between hypocotyl elongation and the log. of GA concentration.—Univ. Coll. Wales, Aberystwyth.

1560. Čajlahjan, M. H., and Ložnikova, V. N,
The influence of gibberellin-like substances, extracted from the leaves of various plants, on the growth and flowering of rudbeckia. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **128**: 1309-12, bibl. 7, illus.

A 0·02% gibberellin solution caused *Rudbeckia bicolor*, normally a long-day plant, to flower in short days. Acetone extracts of leaves of a short-day tobacco variety, Mammoth, and of rudbeckia itself, applied to the centre of the leaf rosette, also caused rudbeckia plants to flower in short days, whereas extracts from *Perilla nankinensis* and water had no effect. Extracts from leaves of a short-day tobacco variety grown in long days were most effective in causing rudbeckia to flower in short days.

1561. Litvinenko, S. N.
A contribution to the study of growth stimulants—gibberellins. [Russian.]
Bot. Žurnal, 1959, **44**: 645-7, bibl. 7, illus.

See *H.A.*, 30: 73.

1562. Sachs, R. M.
The effect of Amo-1618 and gibberellic acid on cell division and shoot development.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): xvii.

In chrysanthemum plants treated with Amo-1618 cell division in the subapical region was almost stopped, and a dwarf, or rosette, growth habit resulted. GA reversed this cell division inhibition and produced a normal elongate stem.—Univ. Calif., Los Angeles.

1563. Halevy, A. H., and Cathey, H. M.
Growth of cucumber (*Cucumis sativus*) seedlings as affected by concentration and structures of quaternary ammonium carbamates.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): ix.

mo-1618 and compounds with related structures etarded growth at the highest concentration tested ·5 × 10^{-3}M). Ring carbamates with 5 and 6 embers slightly stimulated elongation at 3·3 × 0^{-5}M; higher concentrations retarded growth ithout phytotoxicity. Carbamates with phenyl r long alkyl group substitutions were phytotoxic. high concentrations dimethyl and ring caramates with an oxygen substitution retarded the rowth of hypocotyls, but they had no effect on, or ven stimulated elongation of, the radicles.—.S.D.A., Beltsville, Md.

564. Marth, P. C., and Mitchell, J. W.
Persistence and effectiveness of soil application of a plant regulator that induces plants to grow as dwarfs.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): x.

he quaternary ammonium compound designated mo-1618 has persisted in soil for more than 8 ears in the greenhouse. Soils treated with 0, 1, 0 and 100 lb. per acre of the regulator have roduced 24 mature crops of Black Valentine eans over the 8-year period and continue to make lants dwarf at the 10- and 100-lb. rates, but not t the 1-lb. rate. Bean plants grown in soil to hich 10 lb. per acre had been applied in June, 1950, ere about ½ the size of the controls, whereas those soils treated at the 100-lb. rate were about ¼ the ze. The plants affected by Amo-1618 have horter, thickened stems and darker green foliage han the controls. In an experiment in the open mo-1618 was mixed in soil at rates of 0, 1, 5 and 5 lb. per acre in May, 1958. Chrysanthemums sed as test plants (3 varieties) were grown in these oil mixtures during the summer of 1958. At ll-flower in October plants which had received he 1-, 5- and 25-lb. rates were 25, 50 and 75% horter than the controls, respectively. Soil amples were removed from the various treatments nd persistence of the regulator was tested with lack Valentine bean plants. The data show that mo-1618 persisted in the soil for 7 months under eld conditions at the various dosage levels applied. -U.S.D.A., Beltsville, Md.

565. Åberg, B.
Studies on plant growth regulators. XV. The naphthylacetic and the α-naphthylpropionic acids.
Ann. roy. agric. Coll. Sweden, 1959, **25**: 221-39, bibl. 58.

rowth activity studies.

566. Esnault, R.
Action de l'acide α phénoxy-isobutyrique sur l'absorption d'eau par les tubercules de topinambour. **(Effect of α-phenoxy-isobutyric acid on water absorption by Jerusalem artichoke tubers.)**
Ann. agron., 1958, Suppl. II, pp. 157-69, bibl. 32.

Tuber discs were treated with IAA at 1 or 10 mg. per l. water and/or with α-phenoxy-isobutyric acid (POIB) at 10 or 100 mg. per l. IAA alone increased water absorption greatly compared with the control. With POIB alone water absorption was substantially the same as in the controls. When IAA and POIB were applied together the degree of inhibition of water absorption due to POIB depended not upon the absolute concentration of POIB but upon the ratio between the concentrations of POIB and IAA. POIB had little effect on water absorption when present at the same concentration as IAA but reduced it considerably when present at 10 times the concentration of IAA.—Lab. Phys. vég., Paris.

1567. Bertossi, F., and Mainardi, L.
L'acido orotico come fattore di crescita dei vegetali. **(Orotic acid as a plant growth factor.)** [German summary 8 lines.]
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 193-209, bibl. 50, illus.

The auxin-like behaviour claimed by some authors for orotic acid was not confirmed by the experiments here described. The inhibition of root growth in lupin seedlings, occurring only at a relatively high concentration (1 g./l.) was a toxic effect, and a stimulation of lateral root formation at 0·64 M × 10^{-3} developed only slowly and was barely significant.

Experimental and statistical techniques.

(*See also* 1784, 2348, 2423, 2432, 2474, 2484, 2492, 2520, 2521.)

1568. Malavolta, E., Arzolla, J. P., and Haag, H. P.
Sôbre a determinação do nitrogênio, do fósforo e do potássio no mesmo extrato. **(The determination of nitrogen, phosphorus and potassium in the same extract.)** [English summary ⅓ p.]
An. Esc. sup. Agric. Queiroz, 1957-1958, **14/15**: 13-19, bibl. 1.

A method is described for plant material.

1569. Medvedev, Ž. A., and Zabolockij, N. N.
A simple method for the rapid determination of the effect of radiation from radioactive isotopes on the synthesis of lipoids and nucleic acids in plants. [Russian, with English summary 9 lines.]
Izv. Timiryazev. seljsk. Akad., 1959, No. 3, pp. 183-92, bibl. 14.

Different doses of P^{32} and S^{35} were introduced into leaves of *Vigna ruber* and *Phaseolus vulgaris* by standing excised leaves with their cut petioles in solutions of radioactive K_2HPO_4 or K_2SO_4. The effect of dosage on contents of phospholipoids, DNA and RNA was studied by a method involving autoradiography of leaf imprints [see also *H.A.*, 28: 1019]. Increased doses of both isotopes reduced the rate of synthesis of DNA but were without effect on the synthesis of phospholipoids or RNA.

1570. Glastonbury, H. A., and Stevenson, M. D.
The microestimation of γ-(4-chloro-2-methylphenoxy) butyric acid, γ-(2:4-dichlorophenoxy) butyric acid, and *n*-butyl γ-(2:4-dichlorophenoxy) butyrate in plant material.
J. Sci. Food Agric., 1959, **10**: 379-85, bibl. 6.

A radioactive isotope dilution technique is used to obtain quantitative results from non-quantitative procedures, and infra-red spectroscopic analysis gives the necessary specificity. The sensitivity is 1 p.p.m. of the acids for a maximum sample weight of 200 g. and 2 p.p.m. of ester for a maximum sample weight of 50 g. The method has been applied in field experiments on residue levels of the 3 herbicides, and one typical series of results is given. [From authors' summary.]—May & Baker Ltd., Dagenham, Essex.

1571. Heinisch, E.
Chemische Methoden zum Nachweis oder zur Bestimmung von Pflanzenschutzmittelrückständen auf oder in pflanzlichem Erntegut. I. Extraktion und Reinigung der Extrakte. (**Chemical methods for determination and estimation of the residues of chemicals used in plant protection. I. Extraction and separation.**) [English and Russian summaries 10 and 14 lines.]
NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 161-5, bibl. 43.

A survey of the literature, mainly German and American.

1572. Preece, T. F.
A staining method for the study of apple scab infections.
Plant Path., 1959, **8**: 127-9, bibl. 6, illus.

Method adapted from medical mycology.

1573. Quiceno H., G.
Nociones sobre las medidas de dispersión en estadística. (**Ideas on the measurement of dispersion in statistics.**)
Cenicafé, 1959, **10**: 143-57, bibl. 6.

With special reference to bean sampling in 2 varieties of coffee.

Practical and research equipment.

(*See also* 1503, 1505, 1515, 1516, 1593, 1746, 1747, 1828, 1839, 1849, 1850, 1931-1933, 2132, 2173, 2188, 2299, 2374, 2383, 2398, 2449, 2656, 2886, 2901, 2966, 3011, 3056.)

1574. Eastoe, J. E., and Pollard, A. G.
Some effects of the flowerpot on plant growth.
Plant and Soil, 1959, **11**: 331-42.

Physical and chemical properties of 5 types of clay pot were examined. In 4 types the porosity values were very similar, averaging 28%, whereas in the fifth it was 39%. After 3 months' immersion in water some of the pores in 2 types remained unfilled with water, presumably because of their small size. Very considerable variation in air and water permeabilities between the various types was found. Moisture loss from pots filled with moist soil increased with pore size up to a maximum and then decreased. Chemically, pot material contained all the major plant nutrients except N. New pots were alkaline and remained so after containing an acid soil for 2 months. Nutrients in the stream of water passing through the pot may either crystallize on the outside of the pot, combine chemically with it or remain in solution within the pores. Neither K nor nitrate was absorbed by pot material, but a marked P absorption occurred. Analysis of pots which had been used for growing plants indicated that nutrients, except P, diffused back into the soil. By growing mustard in the various pots it was found that as soon as plants had produced root systems the N concentration in the soil solution dropped to zero, the plants thereafter presumably depending upon nitrification of organic matter, which was greatest in the most permeable pots. In comparison with the amount of soil explorable by roots N uptake was high. After 8 weeks' growth plants in the pots of medium permeability were the largest, followed by those in pots of the lower and then the higher permeability. An increasing N and K uptake by the plants was found with increasing pot permeability. Pots of medium permeability produced the best root development.—Imp. Coll., London.

1575. McCall, W. W.
Moisture studies with greenhouse soils.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 35-42, bibl. 4, illus.

Of 5 types of pot tested for soil moisture retention, 2 non-porous types, asphalted paper and plastic, retained moisture much more effectively than the fired red clay, papier-maché and pressed peat pots. Plants in clay pots showed signs of wilting after 48 hours, whereas in plastic the wilting was not severe after 72 hours. When a sandy loam, a clay loam and a mixture of clay loam, washed sand and peat were compared, the sandy loam dried out fastest and the mixture slowest.

1576. Behrens, W.
"Multitopf" Pflanzenanzuchtplatten—ein Weg zur Rationalisierung. (**"Multipot" plant-raising tray—a labour-saving device.**)
Gartenwelt, 1959, **59**: 329-30, illus.

A plastic tray with flowerpot-shaped indentations

ı 3 pot sizes, in which young plants may be easily
arried.

577. Anon.
Neue Verfahren beim Ballieren und Eintopfen in der Baumschule. **(New methods of ball planting and potting in the nursery.)**
Dtsch. Baumsch., 1959, **11**: 273-6, illus.

tems described and illustrated include a cylin-
rical spade and a new device for placing lifted
lants in a polythene bag.

578. Anon.
Das Pflanzen mit Pflanzmaschinen in der Baumschule. **(Planting by machine in the nursery.)**
Dtsch. Baumsch., 1959, **11**: 279-88, illus.

report on the practical application in the nursery
f a planting machine known as the Super Prefer
or such plants as roses, fruit rootstocks, rasp-
erries and currants, privet, lilac and other deci-
uous and coniferous shrubs. The whole opera-
on, including marking out rows, preparation of
lants, which should not exceed about 18 inches
length, method of traction, etc., is described in
etail. Compared with manual planting, the
aving in cost is claimed to be never less than 50%
nd often to reach 60 or 70%.

579. Utermark, H.
Rodegerät und Pflanzlochbohrer. **(Implements for grubbing trees and drilling plant holes.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 226-8, illus.

escriptions and illustrations are given of a new
inch and of an implement which drills plant holes
5 cm. diameter, up to 1 m. deep) at the rate of
pproximately 150 per hour.

580. Abbiss, H. W.
Machines and techniques for the hillside holding.
Comm. Gr, 1959, No. 3336, pp. 1055-8, illus.

ome methods used for cultivation, spraying, wind
rotection and harvesting in the West of England.

581. Pereau-Leroy, P.
Films plastiques et horticulture. **(Plastic films and horticulture.)**
Rev. hort. Algér., 1959, **63**: 20-3, illus.

or forcing and mulching market garden crops
egetables, strawberries, gladioli).

582. V——, C.
La materia plastica, prodigio anche per l'agricoltura. **(Plastic sheeting, a wonder in agriculture.)**
Ital. agric., 1959, **96**: 996-9, illus.

review of the uses of ordinary and fibre-glass-
inforced plastic sheeting.

1583. Lutkova, I. N.
The role of zinc electrodes in the treatment of soils with electric current. [Russian.]
Fiziol. Rast., 1959, **6**: 486-7, bibl. 12.

In experiments in which zinc electrodes were used, metallic ions entered the soil in quantities toxic to tomato plants.

1584. Anquez, M.
Les matériaux isolants à utiliser dans la construction des chambres froides. **(Insulating materials for use in constructing cold-storage chambers.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 643.

A formula given for calculating the optimal thickness of insulation for cold chamber walls, and the relative merits of cork, fibre-glass and plastic foam discussed.

1585. King, E.
Ein thermo-elektrisch geregeltes Frigorimeter zur wirkungsbezogenen Messung der meteorologischen Umweltbedingungen in der Landwirtschaft. **(A thermo-electrically controlled frigorimeter for the measurement of meteorological conditions in agriculture.)** [English abstract 20 lines.]
Ber. dtsch. Wetterdienst. **56**, 1959, pp. 32, bibl. 98, illus.

1586. Jeník, J., and Kosina, Z.
Thermistorový teploměr pro potřeby fytoekologie. **(A thermistor thermometer for use in phyto-ecology.)** [German summary ⅓ p.]
Preslia, 1960, **32**: 69-78, bibl. 19, illus.

For measuring temperatures on the plant surface, in soil, etc., with an accuracy of ±0·1° C.

1587. Richardson, S. D.
The use of a spherical radiation meter in woodlands.
Forestry, 1959, **32**: 126-37, bibl. 29, illus.

The instrument, originally designed in Holland [see *H.A.*, 23: 119] for use in horticultural and ecological research, was tested under a tree canopy. In comparison with a flat light meter it was found to be less sensitive to changes in direction of light influx and more sensitive to changes in light intensity.—Univ. Aberdeen.

1588. Cooper, G., and Herrington, L.
A remote reading band dendrograph.
Me Fm Res., 1959, **7**(2): 10-12, illus.

A Selsyn transmitter and receiver circuit were used to record daily changes in a tree circumference measured by a bar of Invar steel placed around the trunk.

1589. Gavrilov, N. I., and Eremenko, L. L.
An instrument for measuring leaf areas. [Russian, with English summary 8 lines.]
Fiziol. Rast., 1959, **6**: 508-12, illus.

The leaf is placed below a fluorescent light source on the glass top of a hemispherical bowl painted white inside and containing a photocell with a blue light filter. The reduction in the illumination of the internal surface is measured by a galvanometer and interpreted in terms of leaf area.

1590. Jenkins, H. V.
An airflow planimeter for measuring the area of detached leaves.
Plant Physiol., 1959, **34**: 532-6, bibl. 4, illus.

This consists of 2 identically perforated plates mounted on an airtight drum connected to a constant speed rotary pump. The datum pressure is measured with plate 1 covered. The leaf is then mounted (by suction pressure) on plate 2, and the area determined from the amount of plate 1 which must be uncovered to restore datum pressure. [See also *H.A.*, 29: 2076.]—Waite agric. Res. Inst., Univ. Adelaide.

Greenhouses and soil heating.

(*See also* 2100, 2111, 3031, 3056.)

1591. Mareček, F.
Einige Probleme des Mikroklimas in Gewächshäusern im tschechoslowakischen Gartenbau. **(Some micro-climatic problems in Czechoslovakian glasshouses.)** [English and Russian summaries ⅓ p. each.]
Arch. Gartenb., 1959, **7**: 243-68, illus.

Horticulture under glass has only recently come to the fore in Czechoslovakia. Generally speaking, glasshouses are of 4 types, viz.: (1) The hangar type consisting of 2 sections each 50 m. long and 11–12 m. wide, 5 m. high at the ridge. (2) Buildings made up of 3 to 5 sections, each 3 m. wide, 50 m. long and 2·5 m. high at the ridge. (3) Propagation houses 6 m. wide, 50 m. long and 2·5 m. high at the ridge. (4) Unheated glass structures with several sections, each 3 m. wide and generally 50 m. long. Figures are given showing that only 14% of the whole area under glass (444 ha.) is artificially heated. Observations show that heating conditions are least satisfactory in the largest houses, and hence there is a tendency now to adopt the smaller sizes. Experience shows that there is no danger of ridge ventilation used alone leading to excessive heating, hence a large number of sections can be set side by side. It is found that glasshouses affect the micro-climate of their immediate surroundings, which indicates the possibility of so siting them as to leave protected spaces between them for planting up with early vegetables. The leaving of such spaces would appear to be justified only when the sections concerned are not artificially heated. Since micro-climatic conditions are found to be particularly favourable in unheated glasshouse sections, more and more attention is being devoted to the erection of such structures in the parts of Czechoslovakia specially suitable for vegetable growing.

1592. Thompson, H. J.
Function of shelter in plant environments.
Agric. Engng St. Joseph, Mich., 1959, **40**: 528-31, bibl. 21.

A review, including notes on structure and design of greenhouses.

1593. Whittle, R. M., and Lawrence, W. J. C.
The climatology of glasshouses. I. Natural illumination. [French and German summaries 16 lines each.]
J. agric. Engng Res., 1959, **4**: 327-40, bibl. 17, illus.

Studies with several types of continuous recording photometer over 5 years are described. Higher transmission of sunlight and more uniform light distribution were found in houses orientated east–west [see also *H.A.*, 29: 3197].

1594. Nisen, A.
Le verre martelé en construction horticole. **(The use of hammered glass in horticultural structures.)**
Bull. hort. Liège, 1960, **15**: 3-9, illus.

Hammered glass was found to have a greater insulating effect than plain glass, thus reducing extremes of temperature. Absorption of light was the same in both cases, but more light was lost through reflection from hammered glass. Loss of light due to reflection was minimized, especially when the sun was high, by placing the hammered side of the glass facing downwards. Loss of light was greater from finely hammered glass than from the standard type. Hammered glass caused greater diffusion of light than plain glass. From these findings and from the results of tests with radishes, lettuces and beans it is concluded that early season crops will give less good results under hammered than under plain glass, whereas in summer crops may benefit from the greater diffusion of strong sunlight under hammered glass.—Inst. agron., Gembloux.

1595. Nisen, A.
Contribution à l'étude des propriétés des matériaux de recouvrement des constructions horticoles et des conséquences de leur utilisation. **(A contribution to the study of the properties of materials used for covering horticultural structures and of the effects of their use.)**
Bull. Inst. agron. Gembloux, 1959, **27**: 257-353, bibl. 4.

The introductory section of this thesis was abstracted in *H.A.*, 30: 16. The remaining sections deal with: the passage of light through hammered glass; transmission spectra; refractive indices; diffusing materials and the effects of their ageing; the transparency of coloured materials; heat transmission; and the results of some experiments with strawberries. Loss of light due to moisture conensation is discussed in the general conclusions. n early strawberry crops the fruit ripened in the pen was generally richer in vitamin C (particularly hen the plants had been protected from spring old by transparent covers) and lower in pH than hat ripened under either glass or transparent lastics, the differences being greater in the variety urprise des Halles than in Triomphe de Tihange. n autumn crops of ever-bearing strawberries the H was not affected by the presence or absence of over, but vitamin C was highest in fruit from lants under covers with the best heat-insulating roperties, e.g. P.V.C., glass or polyester. The ast named, although thicker and hence less transarent than ordinary plastic films, had no significant dverse effects on fruit quality. For heat conervation under glass, a lining of plastic material is onsidered to be as effective as, and much more conomical than, a second layer of glass.

596. PETROVA, R.
Spectral transmission of various types of glass used in horticulture. [Bulgarian, with Russian and German summaries ½ p. each.]
Nauč. Tr. visš. selskostop. Inst. G. Dimitrov, Sofia, 1959, **7**: 539-46, bibl. 4, illus.

he intensity of visible light under all the glass amples tested was approximately 90%, and that nder polythene sheets 80%. The glass transitted light from all the visible region of the pectrum and also from the near ultra-violet, hereas the polythene also transmitted almost the hole ultra-violet region of the spectrum. The oefficient of extinction was much greater for polyhene sheets than for glass. Soiling the glass had relatively slight effect on the width of the spectral ransmission, changing its short wave limit by nly about 30 Å in the direction of the long waves. t had a great effect on the intensity of the transitted light, however, decreasing it by half; the lue rays were decreased the most and the red rays he least.

597. DODILLET, H. J.
Folienhäuser im Gemüsebau—wirtschaftlich? (**Are plastic greenhouses economic for vegetable growing?**)
Gartenwelt, 1959, **59**: 393-5, illus.

he mobile house of plastic film is considered unconomical for vegetable crops, because its cost rice amounted to about 42 DM/sq. m., whereas 3–20 DM was calculated to be an economical gure. The calculations are based on two years' ials. [For an earlier report see *H.A.*, 28: 399.]

598. ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE, CANTERBURY DISTRICT COUNCIL.
Proceedings of the Conference on Glasshouse Heating and Construction, Christchurch, N.Z., Sept. 1959, pp. 34.

he following papers and the discussions on them are reported: Glasshouse construction in Canterbury today, by J. Coombe. Plastic as a glasshouse construction material, by S. Challenger. Metal alloy glasshouses, by R. T. Hendry. Experience in the use and construction of a mobile house, by F. C. Lucas. Experience with polythene covered houses, by L. Clark. In defence of wood, by I. A. Horsley. Electrical heating of glasshouses—the present day position, by C. B. Phillips. Glasshouse heating by electricity, by C. J. Bramley. Comparison of glasshouse heating costs, by J. H. Glazebrook. Oil heating equipment, by J. O. Taylor. The change from coke to oil, by J. McIlroy. Glasshouse heating with hot air, by W. B. Olorenshaw. Electrical heating, and ideas for the future, by L. Clark. House plants and how to grow them, by J. O. Taylor.

1599. SHELDRAKE, R., AND LANGHANS, R. W.
Heating plastic greenhouses.
Bull. N.Y. St. Flower Grs, 1959, No. 166, pp. 1-2.

Heating problems were investigated in 2 greenhouses covered with 0·004-inch polyvinyl chloride and supplied with oil-fired, hot-air furnaces; in one house an inner layer of 0·002-inch polythene was installed with a 2-inch air space between the two layers of plastic. The results of one season's study showed that an inner layer of plastic allowed a saving of about 40% in fuel costs. It also practically eliminated drip. More light reached the plants through 2 layers of plastic than through 1, owing to the absence of a moisture film on the inner surface. The inner layer must be securely attached to the framework, with no air leaks, and there should be a space of 1–2 inches between the 2 layers.—Cornell Univ.

1600. MANZER, F., AND MERRIAM, D.
Cut fuel costs 40 per cent—get better plant growth with plastic lined greenhouses.
Me Fm Res., 1959, 7(2): 35-6, illus.

The amount of heat required for a house lined with 3-mil. plastic was only 56% of that required for a similar unlined house.

1601. GRYZENKOV, B. M.
Gas heating of greenhouses. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 19-21.

A study of costs.

1602. SIDOROV, A. I.
Sulphurous fumigators for disinfecting frames and greenhouses. [Russian.]
Sad i Ogorod, 1959, No. 8, pp. 19-20.

Briquettes composed of 75% sulphur, 22% potassium nitrate, 3% kiesel-guhr, made in a hydraulic press with a pressure of 500–1,000 kg./sq. cm., were found to be safe and stable during transport. Against spider mites, 28–35 g. sulphur/cu.m. was found to be effective. Hermetically sealing the house for 20–24 hours, low atmospheric humidity and a temperature above 10° C. all increased effectiveness.

1603. VOGEL, G.
Untersuchungen über Bodenheizung mittels Dampf im Freiland. (**Soil heating by means of steam in the open.**) [English and Russian summaries ¼ p. each.]
Arch. Gartenb., 1959, **7**: 285-303, bibl. 13, illus.

Trials were made at Grossbeeren on steam-heating soil, in which lettuces were grown, using pipes of different diameter, at different depths in the soil, fixed at different distances from one another and served by different pressures of steam. Data, which are discussed, indicate that 65 or 80 mm. pipes are best, the former being slightly the more economical. The best spacing for 65 mm. pipes in light and medium heavy soils was 0·7 to 0·8 m., and the most suitable depth for such pipes for optimum heat production, ease of working and plant growth was 0·25 to 0·35 m. Fairly even heating was obtained by the use of 65 mm. pipes preferably not more than 15·0 m. long, with low pressure steam ($p = 0 \cdot 3$ atmospheres above normal air pressure) forced in from one side. [See also *H.A.*, 28: 2515 and 29: 3551.]

TEMPERATE TREE FRUITS.

General.

(*See also* 1490, 2699, 3043, 3065.)

1604. THE FRUIT WORLD, MELBOURNE.
The Fruit World Annual.
Fruit World, Melbourne, special issue, 1959, pp. 80, illus.

In addition to information on fruit markets and trade, this Annual contains the following items: A table for the identification and control of fruit pests and diseases. A review of the position in bulk handling, by W. F. Walker. Refrigeration in relation to the soft fruit industry, by G. B. Tindale. Cool storage of apples and pears, by E. G. Hall.

1605. WIRTH, H.
Methodik und Ergebnisse der repräsentativen Obstbaumzählung im Bundesgebiet 1958. (**The fruit tree census in the Federal Republic 1958, methods and results.**)
ErwObstb., 1960, **2**: 12-16.

1606. SPOOR, P. A.
Produktiekosten van appelen en peren. (**Production costs for apples and pears.**) [English summary 18 lines.]
Meded. Dir. Tuinb., 1959, **22**: 430-6, illus.

Types of culture, maintenance costs and yields compared for 3 districts in the Netherlands.

1607. BANDINI, M.
La frutticoltura italiana alle soglie del secondo anno del M.E.C. (**Italian fruit production at the outset of the second year of the European Common Market.**)
Frutticoltura, 1959, **21**: 571-8.

Trade figures for deciduous tree fruits and citrus fruits.

1608. ZUCCHINI, M.
Le conquiste della frutticoltura laziale. (**Achievements of fruit growing in Lazio.**)
Ital. agric., 1959, **96**: 1053-66, illus.

Production figures and some varieties and methods.

1609. CESARI, C.
Impianto ed allevamento razionale dei fruttiferi. (**Planting and rational management of fruit trees.**)
Frutticoltura, 1959, **21**: 579-85, illus.

Including recommendations for varieties of apple, pear and peach, with rootstock, planting distance and training system for each.

1610. MOSTI, A.
La coltura del pesco nella collina toscana. (**Growing peaches in the Tuscan hills.**)
Frutticoltura, 1959, **21**: 586-90, bibl. 1, illus.

Chiefly on choice of varieties.

1611. MORETTINI, A.
La coltura del pero in provincia di Verona. (**Growing pears in the province of Verona.**)
Progr. agric., 1959, **5**: 1239-47, illus.

Economics, planting, varieties.

1612. NATIVIDADE, J. V.
O património fruteiro português. (**The Portuguese fruit growing heritage.**) [English and French summaries ½ p. each.]
Bol. Jta nac. Frutas Lisboa, 1957, **17**: 9-17, [received 1959].

A review and recommendations.

1613. SOARES, J. M.
A fruticultura no concelho de Loulé. (**Fruit growing in the Loulé district of Portugal.**) [French and English summaries ½ p. each.]
Bol. Jta nac. Frutas Lisboa, 1957, **17**: 27-66, [received 1959].

Report of a survey on the distribution of various fruits and nuts.

1614. DUBROVA, P. F.
The development and distribution of fruit growing in the U.S.S.R. [Russian.]
Sad i Ogorod, 1959, No. 12, pp. 28-31.

The total area under top and small fruits has increased 5-fold since 1928, amounting in 1958 to 3,100,000 ha., of which over 1,325,000 ha.

are in the Ukraine. Average yields in the different regions vary enormously, and the production costs in the Urals, Siberia and the Far East are 9 times higher than those in the Tadžik SSR. Future prospects are discussed.

1615. André, C.
L'arboriculture fruitière en U.R.S.S. **(Top fruit growing in the U.S.S.R.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 645-52, illus.
A review.

1616. Eggenberger, W.
Anforderung an Pfähle und Stickel im Wein- und Obstbau. **(The demand for posts and stakes in vine and fruit growing.)**
Schweiz. Z. Obst.- u. Weinb., 1959, **68**: 593-612, bibl. 19, illus.
Notes on the use of iron, cement or wooden stakes in fruit plantations. The care and preservation of wooden posts are discussed in detail.

Breeding and varieties.

(*See also* 2199, 2800, 3028, 3041, 3057, 3060.)

1617. Enikeev, H. K.
Results of interspecific hybridization of top and small fruits. [Russian.]
Agrobiologija, 1959, No. 6, pp. 924-8.
The technique and results of crossing different species of *Malus*, *Prunus*, *Grossularia*, *Ribes*, *Rubus* and *Fragaria*, and of crossing *Malus baccata* × *Pyrus communis* and *Grossularia reclinata* × *Ribes nigrum* are described.

1618. Sikka, S. M.
Breeding of fruit plants in India.
Indian J. Hort., 1958, **15**: 10-18, bibl. 22.
A review of world literature, with suggestions for future breeding work in India.

1619. Krishnamurthi, S., Randhawa, G. S., and Singh, J. P.
Induction of mutations in fruit trees—a review.
Indian J. Hort., 1958, **15**: 94-100, bibl. 59.
Work with X-rays and other types of irradiation on apple, pear, cherry, black currant and citrus is reviewed.

1620. Brooks, R. M., and Olmo, H. P.
New varieties of tree fruits, berries, grapes.
Amer. Fruit Gr, 1960, **80**(1): 16-17, 45-7, illus.
Descriptions of 11 apple varieties, 1 avocado, 1 blackberry, 2 blueberries, 2 carobs, 4 cherries, 2 grapes, 2 nectarines, 14 peaches, 2 pecans, 2 persimmons, 2 plums, 3 strawberries and 3 walnuts.

1621. Schander, H.
Die Frühselektion bei der Apfelzüchtung am Beispiel der Züchtungsarbeiten an der Obstbauversuchsanstalt Jork. **(Early selection in apple breeding as practised in the breeding work at the Fruit Research Institute, Jork.)**
ErwObstb., 1959, **1**: 174-6, bibl. 10.
The author discusses progress made in the Jork breeding programme, in which seedling characters are classified as those related to (1) environmental adaptation, (2) genetical factors and (3) fruiting potential.

1622. Zaec, V. K.
Comparative winter hardiness of apple varieties. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 10-15.
More than 50 varieties are classified.

1623. Schaap, A. A.
Ervaringen met nieuwe appelrassen. **(Experience with new apple varieties.)**
Fruitteelt, 1960, **50**: 108-9, 137-8, illus.
Preliminary comments on the behaviour and quality of Alton, Owen Thomas, Mantet, Puritan, Greendale, Oriole and Beacon.

1624. Ritter, C. M., Hitz, C. W., and Hewetson, F. N.
Some promising new apple varieties.
Science for the Farmer, 1959, 7(1): 6.
Idared, Melrose, Franklin, Monroe and Ruby.

1625. (Doll, C. C.)
Jonadel apple variety not alternate bearer.
Ia Fm Sci., 1959, **14**: 360, illus.
Jonadel, Delcon and Ames 603 all proved to be annual bearers. Delcon has little commercial value but is excellent for home planting. Ames 603 has stored well.

1626. Fisher, D. V.
The Spencer apple.
Fruit Var. hort. Dig., 1959, **14**(1): 15-16.
McIntosh × Golden Delicious.

1627. McKenzie, D. W., and Mouat, H. M.
Freyberg, a new apple variety.
N.Z. J. agric. Res., 1959, **2**: 1085-6.
See *H.A.*, 30: 141.

1628. Pisani, P. L.
Osservazioni sulle caratteristiche morfologiche delle lamburde di alcune cultivar di pero. **(Observations on the morphological features of the fruit spurs of some pear varieties.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 333-44, bibl. 27, illus.
Correlations are calculated for 54 pear varieties

between the diameters of the buds and the angles of their tips. Features which should prove useful in classification and identification of varieties are: colour, surface and size of the previous season's woody shoot, and size, colour and shape of the buds. Numerical data are supplied for all these characters.

1629. Pereira da Silva, A. S.
A pereira Smith, uma grande oportunidade. **(The pear variety Smith, a great opportunity.)**
Comun. Inst. agron. Sul Pelotas, **14**, 1957, pp. 3.

A Japanese pear, successfully acclimatized at Pelotas, Rio Grande do Sul, Brazil.

1630. Zielinski, Q. B.
New cherry varieties.
Bett. Fruit, 1959, **54**(4): 5-6, 18.

Brief notes on the performance in the U.S. of 14 relatively new varieties of American, Canadian and English origin.

1631. Zielinski, Q. B., Sistrunk, W. A., and Mellenthin, W. M.
Sweet cherries for Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **570**, 1959, pp. 19, illus.

Full descriptions of 21 varieties, with pollination requirements and evaluations of canned, brined and fresh fruit of 37 varieties [see also *H.A.*, 29: 3310g].

1632. Spina, P.
La coltura del ciliegio nella zona etnea. Ricerche sulla biologia fiorale e descrizione delle cultivar. **(The cultivation of cherries in the region of Mount Etna. Studies on floral biology and descriptions of the varieties.)** [English summary ¼ p.]
Ann. Sper. agrar., 1959, **13**(4), Suppl. pp. XLIII-CXXXII, bibl. 43, illus.

Including descriptions of 31 sweet cherry varieties.

1633. Lammerts, W. E.
New flowering-fruiting peaches adapted to home garden use.
Fruit Var. hort. Dig., 1959, **14**(1): 12-14.

Hybrids with good fruit and decorative blossom.

1634. Neri, M.
La pesca Gialla di Morsiani. **(The peach variety Gialla di Morsiani.)**
Frutticoltura, 1959, **21**: 635-7, illus.

A vigorous variety, ripening in the marketing gap between S. Anna Balducci and Hale.

1635. Casini, E.
Una nuova pesca precocissima: la Madeleine Pouyet. **(A very early new peach variety, Madeleine Pouyet.)**
Tecn. agric., 1959, **11**: 244-7, bibl. 12, illus.

A mutation of French origin from Mayflower.

1636. Lobanov, G. A.
Winter hardiness of plum varieties. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 15-19.

30 varieties classified.

1637. Potapov, S. P.
Winter hardiness of plum trees in the region south of Moscow. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 4, pp. 222-6, bibl. 1, illus.

Tests on 43, mainly new, varieties, classified into 5 groups.

1638. Krivoševa, L. S.
Figs in Kirgizija. [Russian.]
Tr. Inst. Bot. Akad. Nauk Kirg. SSR., 1958, No. 3, pp. 117-24, illus.

Assessment of flavour and aroma, and varieties recommended for the region.

Propagation and rootstocks.

(*See also* 1515, 1517, 1578, 1682, 1693, 2666, 3050.)

1639. Ven'jaminov, A. N., and Dolmatova, L. A.
Stratification of seeds. [Russian.]
Sad i Ogorod, 1959, No. 11, pp. 46-9.

Seeds of apple and cherry were exposed to temperatures of 5–7° C. for 50 or 70 days and 120 or 180 days respectively, followed by varying periods of up to 120 days at −1° to −2° C. The best germination in field and laboratory tests was obtained with apple after treatment for 50 days at 5–7° C. followed by 100 days at −1° to −2° C., and with cherry after 120 days at 5–7° C. followed by 100 days at −1° to −2° C.

1640. Ryndin, S. D.
The influence of conditions during the raising of seedling rootstocks on their behaviour in the nursery. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 31-4.

Seedlings of apple and pear wildings, raised in nutrient pots, increased more in height, girth and root growth in their first year than those sown normally in the open soil. There was also a higher percentage of successful grafts on seedlings raised in the pots. Distribution of P^{32} in the grafted tree was studied after a 3% solution of labelled superphosphate had been sprayed on the leaves. Trees grafted on seedlings raised in the pots showed a greater total uptake of P^{32}, and a larger proportion of the total P^{32} was found in the stock, than in trees grafted on normally raised seedlings. This, it is claimed, demonstrates a more active exchange between the component parts of the tree.

1641. Zagaja, S. W.
Some physiological and embryological aspects of immature peach embryos.
Diss. Abstr., 1959, **20**: 1122, being *L.C. Card No. Mic.* 59-3614 of 68 pp.

Evidence was obtained that fruit ripening of early-ripening peaches was followed by embryo abortion. Immature peach embryos were found to have after-ripening requirements similar to those of most mature peach seeds. Stratification decreased contamination in the cultures, improved germination and improved growth of immature embryos; it was also necessary for the production of normal seedlings. The best results were obtained with a stratification treatment of 1 month at 5° C. followed by 4 months at 1° C. In analyses of peach embryos, 16 amino acids were identified. The number of amino acids found in embryos of very early-ripening peaches was less than in later ripening ones. Samples taken early in the season contained fewer amino acids than samples taken later, whether or not the fruits were ripe. The number of amino acids detected in the early-harvested samples was greater in stratified embryos than in freshly-harvested samples. Considerable growth and accumulation of dry matter occurred in the cotyledons of the embryos during stratification.—Rutgers Univ.

1642. Weaver, G. M., and Hough, L. F.
Seedling growth studies of early-ripening peaches. I. Interrelationship between embryo maturity, growth substances and seedling growth.
Amer. J. Bot., 1959, **46**: 718-24, bibl. 20, illus.
Weaver, G. M.
Seedling growth studies of early-ripening peaches.
Diss. Abstr., 1959, **20**: 1122, being *L.C. Card No. Mic.* 59-3609 of 66 pp.

Peach fruits of "Raritan Rose" were harvested 75, 83, 91, 99 and 107 days after full bloom. Embryos were excised and cultured on artificial media. Growth responses following 8 weeks' cold treatment varied considerably with embryo maturity. No correlation existed between seedling survival and the initial responses of shoots. Root growth of 83-day embryos exceeded that of all other stages of maturity. This was reflected in maximum seedling survival and vigour. Initial shoot growth was greatest from embryos harvested at 91 days and at maturity (107 days), but all shoots developed into rosettes, which may expand only slightly or develop normally from axillary buds. Bioassays of growth substances suggest a strong correlation between early shoot development and auxin concentration. Root growth responses appeared to be correlated with a promoter-inhibitor balance. The results of wheat coleoptile assays of embryo extracts suggest the presence of 3 growth promoters. Two growth inhibitors were present in embryo tissue at R_f values 0·27 and 0·96, the former decreasing in concentration with increasing embryo maturity. [From authors' abstract.]—N.J. agric. Exp. Stat., Rutgers.

1643. Biggs, R. H.
Relation of growth substances to after-ripening of peach seeds.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): vii.

Growth inhibitors were present in much greater amounts in non-after-ripened embryos than in after-ripened embryos.—Univ. Fla, Gainesville.

1644. Mes, M. G.
Gibberellic acid and the chilling requirements of peach seeds.
Nature, 1959, **184**: 2034-5, bibl. 8.

Experiments by the author, and others reported in *H.A.*, 29: 2147, failed to confirm published reports [see *H.A.*, 29: 2093j] that gibberellic acid can eliminate the chilling requirements of peach seeds. Although GA appears to increase the germination rate of unstratified seeds, it does not overcome physiological dwarfing.—Univ. Pretoria.

1645. Bruhlej, M. A.
Increasing the winter hardiness of peach seedlings. [Russian.]
Sad i Ogorod, 1959, No. 8, pp. 45-6.

Vernalization for 90 days at 0°–1° C. of peach seeds previously germinated for 4–5 days increased the winter hardiness of the seedlings. Vernalization for 20 days, even when the seedlings were given extra autumn illumination, was not effective. [See also *H.A.*, 30: 173.]

1646. Grebinskaja, M. I., and others.
The effect of Co^{60} gamma rays on mulberry seeds. [Russian, with Uzbek summary 7 lines.]
Doklady Akad. Nauk Uz. SSR., 1959, No. 10, pp. 17-19, bibl. 9, illus.

Mulberry seeds irradiated at 1,500–10,000 *p.e.r.* (physical equivalent radiation) germinated 4 days earlier than untreated control seeds and exhibited a marked acceleration in growth, whereas seeds irradiated at 25,000 *p.e.r.* or more showed depressed germination and many of the seedlings died before they were 10 days old.

1647. Hatcher, E. S. J.
The propagation of rootstocks from stem cuttings.
From abstr. in *Ann. appl. Biol.*, 1959, **47** 635-9, bibl. 6.

Techniques involving controlled winter storage of hardwood cuttings of apple and plum and the mist propagation of softwood cuttings are described.

Transference of softwood cuttings from mist needs great care and the use of growth substances, high temperature and pots may be necessary. Transference of hardwood cuttings is safer but overstimulation should be avoided. An experiment is described, in which widely varied source shoots were obtained by root and stem pruning with marked benefit to rooting in some cases. The budding of a rootstock from a hardwood cutting may be done either on the original stem or on the new growth.—E. Malling Res. Stat., Kent.

1648. Flerov, B. P.
Something new in the propagation of apples and pears by cuttings. [White Russian.]
Sel'sk. Gasp. Belarusi, 1957, No. 3, pp. 37-8, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,823.

The best rooting, up to 42%, was obtained with apple cuttings from young soft shoots on which the terminal buds had not yet formed. Cuttings taken early survived the winter well, whereas those taken in August or later perished. It was also found possible to propagate apples by cuttings from thin lateral roots. The propagation of one pear variety by summer cuttings was also successful.

1649. Tarasenko, M. T.
Effect of growth regulating substances on the rooting of cherry and plum cuttings. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 4, pp. 37-62, bibl. 37, illus.

Cuttings of different varieties of cherry and plum varied greatly in their response to treatment with growth regulators. In general, IAA and IBA accelerated rooting and doubled the number of rooted cuttings, but in some varieties the number was increased by as much as 5–6 times. Cuttings taken in mid-June rooted much better than those taken in mid-July, the difference being especially noticeable in basal cuttings.

1650. Tarasenko, M. T.
Effects of concentrations of growth regulators and duration of treatment on the rooting of softwood cuttings of cherry and plum. [Russian, with English summary 7 lines.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 5, pp. 47-62, bibl. 15, illus.

A concentration of 25–50 mg./l. IAA for 12–24 hours was found to be the best treatment under normal conditions. Higher concentrations reduced rooting, especially with plums. Under unfavourable rooting conditions increasing the concentration was most effective for cherries, whereas increasing the duration of treatment was better for plums. The effectiveness of different concentrations of IAA, IBA and NAA in promoting rooting was also compared.

1651. Karnatz, H.
Versuche zur chemischen Entblätterung von Obstgewächsen in der Baumschule. **(Experiments on the chemical defoliation of fruit trees in the nursery.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 208-14, bibl. 5.

The optimum temperature range for the use of Endothal (16–25° C.) is rarely reached in the late autumn in Germany. Results obtained in defoliation experiments in fruit nurseries were therefore unreliable. Moreover, it was also shown that the response of the plant to the defoliant depends on the stage of maturity. With species and varieties maturing early, chemical defoliation proved successful, but it is believed that the plants would have shed their leaves naturally following lifting.

1652. Chadha, T. R.
Description of some of the wild local rootstocks used for apple, pear, cherry and persimmon in the Kulu valley.
Indian J. Hort., 1957, **14**: 119-22, illus., [received 1959].

Pyrus baccata for apple, *P. serotina* and *P. pashia* for pear, *Prunus cerasoides* for cherry, and *Diospyros lotus* for persimmon.

1653. Boulay, H.
Choix de porte-greffes, des formes et des distances de plantation des arbres fruitiers. **(Choice of rootstocks, training systems and spacing for fruit trees.)**
Jardins Fr., 1959, **5**: 176-81, illus.

The three points are considered generally and are finally summarized in tabular form for apples, pears, cherries, apricots, plums and peaches on different types of soil.

1654. Habran, R.
Pensez dès maintenant à vos greffages. **(Begin thinking now about grafting.)**
Bull. hort. Liège, 1960, **15**: 44-5, 49.

Hardness of wood and suction force of the sap tabulated for 24 apple, 17 pear, and 4 plum varieties, and general recommendations for grafting.

1655. Dolgov, V. F.
Biological properties of new dwarf and semi-dwarf rootstocks. [Russian.]
Agrobiologija, 1959, No. 6, pp. 938-9.

Two new vegetatively propagated apple rootstock varieties showed better survival and greater winter hardiness than Paradise IX, Doucin III and seedlings of 2 commercial varieties. The new varieties also produced a higher percentage of stocks suitable for grafting.

656. Popov, V. N.
The influence of the pollinator used for the parent tree and of the scion variety on the root systems of seedling rootstocks. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(12): 13-17, illus.

The root systems of apple seedlings and nursery ees were studied by means of observation trenches. eedlings raised from seeds of open-pollinated nother-trees or those pollinated with a pollen nixture had more vigorous root systems than those om mother-trees pollinated by a single variety, articularly if that variety was closely related to the nother-tree. Grafting on to the seedling a variety losely related to it reduced the vigour of the root ystem. A direct relationship was observed etween the vigour of the root system and the igour of the aerial organs.

657. Popov, V. N.
The effect of the position of the bud used in propagating new varieties of apple. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1959, No. 7, pp. 44-7, illus.

ropagating a new variety with buds taken from he base of a shoot, or from shoots on the lower part f the tree, produced spiny trees with small serrated aves. Using buds from the upper part of the ee or from the ends of shoots gave rise to trees haracteristic of the mature variety, and these ees flowered earlier.

558. Cambra, M.
Injerto de corona. Comparación de dos métodos. **(Crown grafting. Comparison of two methods.)** [English summary 7 lines.]
An. Estac. exp. Aula Dei, 1959, **6**: 110-15, bibl. 8, illus.

modified method, in which the rind was removed om the whip of the scion, having proved successful ith *Robinia pseud-acacia*, was used for apple trees. he percentage of takes was significantly lower, ut the unions were stronger and more complete nan with the standard method.

559. Hilkenbäumer, F.
Einfluss von Zwischenveredlungen bei Apfelsorten. **(The effect of interstocks on apple varieties.)**
ErwObstb., 1959, **1**: 171-3, bibl. 2.

udies on the behaviour of intermediates in 74 ock-scion combinations showed variable results shoot growth and yield. In general, vegetative owth was affected more than fruit yield and uality. Prinz Albrecht as an interstock improved oth yield and fruit colour of the scion varieties n it, and can be recommended for several com- nations. Early Victoria and Johannes Böttner ere also often satisfactory. Zabergäu and Herrn- ut were not very satisfactory with the combinations sted. Albrecht, Böttner, Early Victoria and James Grieve (all slow-growing varieties), when used as interstocks, frequently induced greater shoot growth than occurred with a direct graft. In contrast Boskoop (a vigorous variety) improved yields of Cox and Glockenapfel on M.IX. Fruit colour of Jonathan on M.IV and of Goldparmäne on M.IX was enhanced by an Albrecht interstock, and that of Cox on M.IX by Victoria. Differences in fruit size were generally related to rootstock.—Inst. Obstb., Univ. Bonn.

1660. Duhan, K.
Untersuchungen über die Verwachsung von Birnsorten verschiedener Affinität mit Quitten-Veredlungsunterlagen. **(Investigations on the unions formed by pear varieties showing different degrees of affinity with quince rootstocks.)**
Bodenkultur, 1959, **10**: 211-31, bibl. 23, illus.

The author discusses the phenomena disclosed by sectioning the union of different combinations of pear and quince, and then continues with an illustrated description of a bench grafting method devised for double-working pear on seedling quince with an intermediate all in one operation. The quince rootstock is shaped by machine to form a central peg of wood. Over this is set a transverse 1 mm. thick disk of an intermediate variety made like a washer by removal of wood and pith; the scion piece, centrally drilled, is then pushed firmly down, so that rootstock, washer and upper scion fit closely together.

1661. Barrett, H. C.
Compatibility of certain pear-quince combinations.
Fruit Var. hort. Dig., 1959, **14**(1): 3-6, bibl. 1.

Graft unions and scion reactions are described for 73 varieties of pear on quince rootstocks.

1662. Kaz'min, G. T.
Raising apricot trees in the Far East. [Russian.]
Sad i Ogorod, 1959, No. 8, pp. 51-2.

When stocks were budded in July-August, only 10% of the young trees survived owing to winter injury. Spring grafting and earlier budding (June-July) were more successful. Seedlings of Manchurian and cultivated varieties of apricot were suitable as rootstocks, but those of Siberian apricot and Ussurian plum were unsatisfactory.

1663. Tamási, J.
Különböző alanyokon álló kajszifák gyökérrendszerének vizsgálata. **(An examination of the root systems of apricot trees grown on different rootstocks.)**
Kert. szől. Főisk. Évk., 1958, **22**(6 part 1): 15-30, from *Hung. agric. Rev.*, 1959, **8**: Abstr. 219.

The root systems of two 30-year-old apricot trees, one on a *Prunus armeniaca* seedling and the other on

P. domestica variety Vörösszilva, growing in a sandy soil, were compared. The tree on the apricot seedling was more vigorous than that on the plum rootstock, and its roots spread more widely and penetrated deeper into the soil.

1664. BAJWA, B. S., KAURA, N. R., AND CHADHA, T. R.
Propagation of cherry.
Indian J. Hort., 1959, **16**: 18-19, bibl. 3.

Seeds of wild cherry (*Prunus cerasoides*) germinated well, especially when sown in April-May soon after their extraction from the mature fruit. Seeds of commercial varieties germinated poorly and had a long rest period. Nine-month-old seedlings of wild cherry were successfully grafted by the tongue method in January, when the stocks were in leaf but the scions were dormant. They produced saleable trees within 2 years of sowing the seed.—Dep. Agric., Punjab.

1665. ŞTEFAN, N., AND TUDOSESCU, O.
Comportarea în pepinieră a principalelor soiuri de prun în regiunea I-a pomicolă altoite pe diferiţi portaltoi. (**Behaviour of the main plum varieties grafted on various stocks in nurseries of the principal fruit area of Roumania.**) [English, French, Russian and German summaries ½ p. each.]
Grăd. Via Liv., 1959, **8**(5): 44 + summaries.

Plums are grafted almost exclusively on myrobalan in Roumania, but experiments showed that certain varieties, for instance Reine Claude d'Althan, were better grafted on the variety Summer Reddish.

1666. GROSJEAN, J.
Zijn pruimen op eigen wortel resistenter tegen loodglansziekte dan pruimen op onderstam? (**Are plum varieties on their own roots more resistant to silver leaf than grafted varieties?**) [English summary 15 lines.]
Meded. Dir. Tuinb., 1959, **22**: 437-40, bibl. 1.

Inoculation trials carried out over 2 years showed that Victoria on Brompton and Czar on Common Mussel were less susceptible to *Stereum purpureum* than the same varieties on their own roots. Victoria on Brompton had an unexpectedly high power of recovery. Early Laxton was equally susceptible when grafted on Brompton and when grown on its own roots. Reine Claude d'Oullins was less susceptible on its own roots than on Brompton. It is suggested that these differences in susceptibility may be due to differences between the root systems in selective uptake of nutrient elements. —Inst. PlZiektenk. Onderz., Wageningen.

1667. SCHOFIELD, E. R., AND CLIFT, L. F.
Trials of the influence of stem builders on bacterial canker of plum in the West Midlands.
Plant Path., 1959, **8**: 115-20, bibl. 4.

Three trials are described in which the 2 canker-susceptible varieties, Victoria and Burbank's Giant Prune, were each high- and low-worked on the 3 rootstocks, Warwickshire Drooper, Myrobalan B and Pershore Yellow Egg. In the one trial where severe infection occurred, Pershore Yellow Egg showed little resistance to canker when employed as a stem-builder. Warwickshire Drooper showed intermediate resistance, and the high degree of resistance of Myrobalan B, observed by other workers, was again demonstrated. There was an indication that Warwickshire Drooper induces some degree of resistance in Victoria, but this observation needs further investigation. Although the value of Myrobalan B as a stock on which to top-work a susceptible variety is clearly shown, the variety has two major disadvantages: persistent sucker production and the liability to produce a large tree, especially on strong soil. [Authors' summary.]—N.A.A.S., Evesham and Worcester.

Climatic factors.

(*See also* 1683, 1727, 1730, 1928.)

1668. LJONES, B., AND HUSABØ, P.
Avlingssvingingane i norsk fruktdyrking. (**Yield fluctuations in Norwegian fruit growing.**)
Frukt og Baer, 1959, **12**: 40-51, bibl. 6.

Annual yield variations in apples, pears and plums from 1907 to 1958 are discussed, with particular reference to weather conditions.

1669. KUŠNIRENKO, M. D., AND ČERNYH, N. M.
Microclimatic conditions in the crowns of apple trees. [Russian.]
Sad i Ogorod, 1959, No. 12, pp. 44-6.

Measurements of temperature, wind speed and relative humidity were made at heights ranging from 0·1 to 6·0 m. in the crowns of apple trees at different distances from a wind break. In winter temperatures were lowest in the lower part of the crown, but in May and June they were higher there than in upper parts. Relative humidity was also higher near the ground in May, and the lower blossoms opened earlier. Wind speeds were greater in the upper parts of the tree, and the upper leaves developed xeromorphic characteristics. Only small differences were noted at different distances from the wind break. At the lowest position, in May, relative humidity was higher, wind speeds were less and minimum temperatures higher in the trees closer to the wind break.

1670. BOUCHET, R.
La lutte contre les gelées par aspersion. (**Frost protection by sprinkling.**)
Ann. Soc. nat. Hort. France, 1959, **5**: 637-40, illus.

The methods of calculating the quantity of water necessary to counteract heat loss from trees by adiation and by conduction/convection are shown y means of formulae and graphs, and the effect f the speed of rotation of the sprinkler on tree mperature is discussed. It is not necessary, and uneconomic, to keep the sprinklers working the hole time that the air temperature is below 0° C.

671. Vávra, M.
Ekologické a agrotechnické předpoklady ochrany ovocných dřevin a révy vinné proti pozdním jarním mrazíkům zakuřováním. **(Ecological and cultural conditions affecting the protection of fruit trees and vines from late spring frost by smoke.)** [Russian and German summaries ¾ p. each.]
Acta Univ. Agric. Silvic., Brno, Ser. A, 1959, No. 1/2, pp. 43-52, bibl. 6.

rost protection by smoke is discussed, and experiments at Lednice in a vineyard and adjoining rchards on the nights of May 12–13, 1955, and pril 9-10, 1957, are detailed. For the protection f apple, peach and apricot trees smoking was not equired before the temperature at a height of 0 cm. had dropped to −1° C. To produce the itial smoke screen the use of smoke generators as necessary, but thereafter the burning of rganic waste sufficed. A temperature of −2·2° C. id not harm peach buds, whereas −2·8° C. amaged more than 60% of open apricot flowers. njury was heaviest in the lower part of the crown. he smoke screen should be retained after sunrise ntil the hoar frost has thawed.

572. Karnatz, H.
Erfahrungen mit der Geländeheizung zur Frostabwehr im Frühjahr 1959. **(Observations on area heating for frost protection in the spring of 1959.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 239-45, bibl. 3.

iscusses distribution and types of oil burners for rchards.

573. da Mota, F. S.
Os invernos de Pelotas, R.S., en relação às exigências das árvores frutíferas de fôlhas caducas. **(Winters at Pelotas, Rio Grande do Sul, in relation to the requirements of deciduous fruit trees.)**
Bol. téc. Inst. agron. Pelotas **18**, 1957, pp. 38, bibl. 55, [received 1959].

ates and durations of flowering are recorded for umerous varieties of apple, peach and plum in e Pelotas area, where winters are mild. The umber of hours at temperatures below 7° C. quired to induce flowering in various peach rieties is shown, the range being 50 to 1,120.

574. Efimov, V. A.
The relationship between the growth and fruiting of sour cherry and topography. [Russian.]
Dokl. Mosk. s.-h. Akad. Timiryazeva, 1957, No. 28, pp. 297-303, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,352.

Sour cherries planted on a slope fruited best on the middle and upper parts of the slope. The yield of an 8- to 10-year-old tree on the middle and upper part was about 20 kg., whereas on the lower slope it was only 8–10 kg. Fruit buds were often killed in severe winters on the lower slopes, where water accumulated, and where there was an increase in soil acidity which was detrimental to the trees.

1675. Levin, J. H., Hall, C. W., and Deshmukh, A. P.
Physical treatment and cracking of sweet cherries.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 133-41.

From a series of laboratory experiments it was concluded that the cracking of cherries was due to excessive absorption of water caused by climatic variations. It was found that the incidence of cracking could be minimized by reducing water absorption, by increasing the transpiration rate and decreasing the expansion of the cells and by increasing the modulus of elasticity of the skin. Water absorption was a function of the soluble solids content and of temperature and could be minimized by reducing the soluble solids in the fruit, increasing the soluble solids in the surrounding water and lowering the temperature. The cracking occurred during drying after soaking and was markedly dependent on temperature. If, however, the cherries were dried in moving air, the transpiration rate could be raised sufficiently to prevent cracking. The modulus of elasticity was found to be greater at lower moisture contents, and also to be increased by certain chemical sprays. It also depended on variety. Suggested lines of further investigation include: the control of air flow in orchards by helicopter or airplane, the use of space heaters, and chemical spraying before and after rain.

Soil management and irrigation.

(*See also* 1524, 2786, 3041.)

1676. Šarašenidze, D. S., and Kačarava, A. P.
The effect of sowing perennial grasses in alternate interrows on the growth of fruit trees. [Russian.]
Sad i Ogorod, 1959, No. 11, pp. 53-5, bibl. 1, illus.

A mixture of perennial grasses, sown in the alternate inter-rows of apple and quince orchards, produced asymmetrical development of the root systems. Lateral extension of the roots in competition with the grasses was reduced in comparison with that of roots in the sectors without grasses.

Asymmetrical development of the root system did not result in asymmetrical development of the aerial parts.

1677. Kemmer, E., and Steckel, W.
Über den Einfluss der Grasnarbe auf Apfelgehölze. **(The effect of a grass cover on apple trees.)**
ErwObstb., 1959, **1**: 167-71, bibl. 7, illus.

Varieties on M.IX which are considered to grow satisfactorily in grass were those whose trunk diameter was more than 82·7% of that of the same varieties growing in clean-cultivated soil and whose yields were more than 86·1%, with a variation of not more than 18·6%, of yields in clean-cultivated soil. Such varieties included Berlepsch, Early McIntosh, Gravenstein and Nordhausen. Varieties which did not react favourably to grass culture were Goldparmäne, James Grieve and Oldenburg. Differences in the growth and yield of trees started in grass and then cultivated, and vice versa, are tabulated.—Inst. Obstb., tech. Univ., Berlin.

1678. Grjazev, N. D.
Concerning soil management practices in the Saratov region. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 43-9.

The results of a 6-year experiment on apples with 4 management treatments, each on 1 hectare, are reported. Clean cultivation with an initial application of dung (30 tons/ha.) produced inferior growth and cropping compared with annual applications of dung and mineral fertilizers or treatments involving initial applications of dung followed by grass-legume mixtures, ploughed in after 1½ or 2½ years. All treatments were irrigated twice during the growing seasons to bring the soil moisture to 70% of field capacity. The number of chlorotic trees was much reduced in the treatments with grass-legume mixtures.

1679. Santrosjan, G. M., and Amirdžanjan, A. B.
Soil management systems in fruiting apricot orchards. [Russian.]
Sad i Ogorod, 1959, No. 11, pp. 55-6.

Although sowing lucerne and rye grass decreased growth and cropping of apricot trees in the first and second years of treatment, by the third year the cover crops had increased soil fertility and cropping compared with clean cultivation. Fertilizing with NPK reduced the check due to the cover crops in the first 2 years.

1680. Barbier, G.
Influence du paillis sur le comportement d'un verger. **(The effect of mulching on the behaviour of an orchard.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 642.

Mulching annually early in winter with 40 tons of straw per ha. in a pear orchard had no effect on tree growth or fruit yield in the first few years, but the 5th crop was 50% greater, and growth and leaf colour were markedly superior, in mulched than in unmulched trees. Two effects which were evident in the mulched plots in the earlier years were a strong growth of the superficial part of the root system and an increase in leaf K greater than that from manuring with K salts. In a part of the same orchard receiving 40 tons of straw mulch the first year, and only 10 tons in each of the 2 succeeding years, no increase in growth or leaf colour was observed.

1681. Soczek, Z.
Studia nad stosowaniem ściółki w młodym sadzie czereśniowym. **(Studies on mulching in a young cherry orchard.)** [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1959, **80**: 39-92, bibl. 128, illus.

After a review of the literature, results are given of an experiment started at Skierniewice in 1948, in which the following mulch treatments were applied in an orchard of Früheste der Mark cherries on mazzard seedling stocks: pine sawdust, rye straw, peat and clean cultivation. The highest yields were obtained from clean cultivation. There was no significant difference in yield between the mulches, which reduced the moisture and N contents of the fruits, depressed top and root growth and increased frost damage 3-4-fold. Compared with clean cultivation mulching increased the levels of moisture, K and NO_3 in the soil, and increased P and K and decreased N in the leaves.

1682. Volz, H.
Untersuchungen über das Auftreten von mechanischen Bodenverdichtungen in Obstanlagen und ihre Auswirkungen auf das Wurzelwachstum von Apfelniederstämmen. **(Studies on the incidence of mechanical soil compaction in orchards and its effects on the root growth of bush apple trees.)**
Inaug. Dissert. Rhein. Friedrich Wilhelms-Univ., Bonn, 1959, pp. 66, bibl. 50, illus.

At the Institut für Obstbau, Bonn, and in several other areas, the roots of apple trees on M.IX, II, IV, I and XI rootstocks were excavated in orchards where heavy tractors and sprayers had been used. The porosity of the soil and its perviousness to air were measured. The deterioration in the soil structure under the wheel tracks was evident from an average loss of porosity of 4-8 volume %. Soil compaction under the tracks occurred to a depth of 30-36 cm. and resulted in a considerable reduction in soil aeration. The roots of M.II, IV, I and XI did not seem to suffer from these changes in soil structure, and could penetrate the compacted layer. The growth of M.IX roots, however, was greatly reduced under the tracks, particularly at depths of

-30 cm., and their course was deflected by the mpacted layer. It is suggested that M.IX be andoned in future in favour of the more vigorous alling rootstocks. Alternatively, the effects on il structure of cover cropping and of deep echanical soil loosening in conjunction with deep oting green manure plants should be studied.

83. POPESCU, M., AND OTHERS.
Comportarea pomilor cultivaţi pe nisipuri. **(Growth of fruit trees cultivated on sands.)** [English, French, Russian and German summaries, $\frac{2}{3}$ p. each.]
Grăd. Via Liv., 1959, **8**(8): 37-41 + summaries.

n sandy soils in the very hot and dry conditions South Oltenia, fruit trees made satisfactory owth only if planted at the bottom of open pits 2 m. deep. Planting in pits 0·8 m. deep may be tisfactory where the water-table is less than 3 m. low the surface.

84. HALLAIRE, M.
Expérimentation sur l'alimentation en eau des arbres fruitiers. **(Experiments on the water economy of fruit trees.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 632-6, illus.

il moisture studies with neutron apparatus in chards in various parts of France during 1957 d 1958 showed that formulae of potential apo-transpiration previously deduced for herceous crops were applicable to apple trees in a t season, when there was little difference between al and potential evapo-transpiration. In a dry mmer, however, the real values for apple and um trees fell considerably below the potential lues, with a constant deficit during August, ptember and October, when soil moisture was actically at wilting point to a depth of about n. The deficit varied very little within a 3 m. dius of 6-year-old plum trees.

35. DARLOT, A.
Le problème des irrigations de complément dans les régions dites humides. **(The problem of supplementary irrigation in the so-called moist areas.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 641-2.

igation is advocated for the fruit-growing areas France with apparently adequate rainfall.

Nutrition and tree composition.

(*See also* 1528, 1534, 1536, 1783, 1926.)

36. WOLF, E., AND VAN NIEKERK, P. E. LE R.
Fertilisation programme for fruit trees and table grape vines in the winter rainfall area.
Dec. Fruit Gr, 1959, **9**: 243-51 and 263.

bles are provided giving fertilizer quantities table for young and bearing trees of apricot, peach, plum, prune, apple, pear and citrus, as well as table grapes. The modifications required to suit local conditions of pH, the use of cover crops, organic manuring and brackish conditions are detailed.

1687. DEVJATOV, A. C., AND BALOBIN, V. N.
Fertilizer application in orchards in relation to distribution of the root system. [Russian.]
Sad i Ogorod, 1959, No. 11, pp. 49-52, bibl. 1.

Investigations on apple trees of different varieties and ages showed that 70–80% of the absorbing roots are under the crown of the tree. Depth and type of soil affected root distribution, but the greatest density of absorbing roots was always near the trunk of the tree. The application of fertilizers close to the trunk of the tree is recommended.

1688. CORIN, C., AND OTHERS.
Contribution à l'étude de la nutrition minérale des arbres fruitiers au moyen des isotopes radioactifs. **(Contribution to the study of mineral nutrition of fruit trees by means of radioactive isotopes.)**
Proc. 1st (UNESCO) int. Conf. sci. Res., 1958, **4**: 382-90, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 2,447.

Penetration studies of P^{32}, Ca^{45}, S^{35} and Fe^{59} into roots, stems and leaves of Cox's Orange Pippin apples on M.IX and M.II stocks cultivated in pots under cover showed that all 4 elements penetrated most into the roots. The leaves showed higher penetration than the stems for P, S and Fe, and under-surfaces of leaves showed better penetration than upper surfaces for all elements with the exception of P penetration into young leaves. Ca, P and S, but not Fe, penetrated leaves better during illumination. Translocation and localization after absorption by roots, stems, leaves and petioles were also studied. Except for S, plants fed *via* the roots concentrated more of the element fed in the root than elsewhere; the mobile fractions tended to concentrate in the leaves. When fed other than through the roots the greatest concentration was always found in the leaves. In general, plants on M.IX showed greater mobility of nutrient elements than those on M.II. A study of the redistribution of elements 2 months after a 15-day absorption by leaves and petioles showed that Ca was not redistributed, 10·5% of the S appeared to migrate from leaves to stems and 5·5% from leaves to the roots, and 60% of the Fe moved from leaves to roots. In a leaching study, in which the leaves were washed in running water at 3 l./min. for 3 hr., the leaves showed the following losses: P^{32}, 12·5%; Ca^{45}, 20%; S^{35}, 27·8%; and Fe^{59}, nil.—Inst. agron., Gembloux.

1689. OLAND, K.
Nitrogenous reserves of apple trees.
Physiol. Plant., 1959, **12**: 594-648, bibl. 63.

Methods are described for the determination of nitrogenous fractions and compounds in the tissues of young apple trees. An application of N in one year had marked effects on tree growth the following year, owing mainly to the mobilization of N reserves. The current year's growth was found to be mainly a function of the initial level of N reserves and of the current supply of N, but the stored N always seemed to be used preferentially. The concentration of soluble N, largely free amino acids, in the storage tissues was highest at the time of initiation of growth and lowest at the end of the growing season. Arginine was the most important of the free amino acids found. Prior to the initiation of growth there was a decrease in the non-soluble fraction. In the leaf tissue the concentration of soluble N was practically constant and low throughout the season, high concentrations of free amino acids being found only in tissues suitable for storage. It is concluded that the accumulation of N reserves in plants with a constant high supply of N occurs from late autumn till spring. Plants that had been previously starved of N may accumulate reserves in summer if supplied with N. These findings indicate a competition for carbohydrate between growth processes and synthesis of N reserves, the growth processes having priority. Plants which had been supplied with N during the previous season terminated growth earlier in the current season than plants with no such previous supply, irrespective of the current N supply. Plants terminating growth early had a low content of soluble N in the storage tissues and a low content of total N in the leaves, possibly owing to an inhibition of N absorption caused by carbohydrate shortage.—Agric. Coll. Norway, Vollebekk.

1690. Säkö, J.
Urearuiskutusten vaikutus omenapuun lehtien typpipitoisuuteen. **(The effect of urea sprays on the nitrogen content of apple leaves.)** [English summary ½ p.]
Maataloust. Aikakausk., 1959, **31**: 184-90, bibl. 8.

In 1954 and 1955 apple trees of 4 varieties were sprayed 4 times after flowering with urea solutions of 1·0 and 0·75%, in addition to receiving an application of 400 kg. ammonium sulphate per hectare. Leaf samples were taken 3 times during the growing season. Urea sprays had a marked effect on the N content of the leaves, the difference between the leaves of treated and control trees being 0·62–1·19% N after the fourth application. This difference was especially pronounced in a dry season when the leaf N content of the controls dropped with the cessation of rain. In September, however, about 7–8 weeks after the last spray, both sprayed and control trees had a similar level of leaf N.—Agric. Res. Centre, Dep. Hort., Piikkiö.

1691. Griffin, E. P.
Nutritional status of New Jersey peach orchards and potassium nutrition of peach trees.
Diss. Abstr., 1959, **20**: 1114-15, being *L.C. Card No. Mic.* 59-3578 of 100 pp.

In a survey of commercial peach orchards in New Jersey analyses of leaf and soil samples revealed few instances of nutrient deficiencies. Differences in nutrient contents of leaves and soils from orchards in 2 areas of New Jersey are outlined. Studies in experimental orchards showed that available soil K and leaf K increased significantly as a result of K fertilization, whereas available Mg and P in the soil and soil pH remained relatively unchanged. In the second year leaf contents of Ca and Mg were significantly decreased in several instances by K fertilization, whereas leaf N and P were hardly affected. In some orchards peach trees responded to K fertilization by an increase in fruit bud formation, fruit set, fruit drop and fruit size, by earlier maturity and by a decrease in the soluble solids content of the juice. Measurements of tree growth and yield showed no relationship to K treatments. Leaf and soil analyses in commercial orchards showed a significant positive relationship between leaf K and soil K. In general, leaf K and soil K were inversely correlated with leaf Ca and leaf Mg. Neither peach yield nor shoot growth was closely related to leaf K or to soil K, but fruit set did show a relationship to leaf and soil K in several orchards. Correlations of soil K with other variables differed with the time of sampling and with the depth of the soil sample taken.—Rutgers Univ.

1692. Díez Altares, M. del C.
Descomposición fotoquímica de la clorofila en casos de deficiencia de hierro. **(Photochemical decomposition of chlorophyll in cases of iron deficiency.)** [English summary ⅓ p.]
An. Estac. exp. Aula Dei, 1959, **6**: 1-80, bibl. 127, illus.

Several varieties of pear were included in the investigations. Under conditions of lime-induced Fe deficiency, chlorotic symptoms were eliminated more rapidly by decreasing the light intensity than by injecting 0·025% ferrous sulphate. In both cases the catalase activity and the content of soluble Fe increased. The reduction of light intensity decreased the ratio of ascorbic acid to chlorophyll. There was no evidence to confirm the claims of certain physiologists that ascorbic acid is directly concerned in the synthesis or decomposition of chlorophyll, but chlorotic leaves with an initial ascorbic acid content as high as, or higher than, that of green leaves, reacted to the application of this acid by turning green. The probable protection of chlorophyll from intense light by polyphenols is discussed.

1693. Bakr Ahmad, M., and Tewfik, M.
The development of chlorosis on young Le Conte pear trees as related to the rootstock.
Indian J. Hort., 1959, **16**: 5-13, bibl. 16.

Foliar application of ferrous sulphate and manganese sulphate increased leaf area, fresh and dry weights per leaf, and moisture contents, but decreased the ash content of leaves of chlorotic Le Conte trees on 3 rootstocks. Contents of Mn in chlorotic leaves were particularly low, whereas those of Fe and ash were higher than in leaves of normal plants. The percentage of chlorotic plants was highest with trees grafted on *Prunus calleryana*, intermediate with trees on *P. communis*, and lowest with those on quince.—Cairo Univ., Egypt.

1694. Rodríguez, C., and Heras, L.
Clorosis calcárea de membrilleros en relación con el ataque por *Entomosporium maculatum* Lev. **(Lime-induced chlorosis of quince trees in relation to infection by *Entomosporium maculatum* [*Fabraea maculata*].)** [English summary 2 lines.]
An. Estac. exp. Aula Dei, 1959, **6**: 106-9, bibl. 11.

Of the 9 quince varieties studied, Provence, Calatayud and Fontenay were resistant to fleck (*Fabraea maculata*) and showed little or no lime-induced chlorosis, whereas those which became moderately chlorotic (E.M. selections A, B and C), or extremely chlorotic, were severely infected.

1695. Bould, C.
New iron chelate shows promise.
Grower, 1959, **52**: 455-9.

General recommendations for the use of iron chelates (including Chel 138 Fe) to correct lime-induced chlorosis of fruit trees.

1696. Eggert, R.
Versenol chelates improve growth of clonally propagated apple trees.
Down to Earth, 1959, **15**(2): 8-10, bibl. 10, illus.

One-year-old *Malus robusta* No. 5 trees grown in Mg-deficient soils showed the best growth and leaf colour response when given Versenol chelate (the disodium salt of N-hydroxyethyl ethylene diamine triacetic acid), Versenol iron chelate spray or Versenol magnesium chelate, all in addition to dolomitic lime. The chelating agents were not effective when applied alone, since without the lime the soil pH remained below 5·0.—N.H. agric. Exp. Stat.

1697. Ystaas, J.
Megnesiummangel hjå epletre tidleg i veksttida. **(Magnesium deficiency in apple trees early in the growing season.)**
Frukt og Baer, 1959, **12**: 32-4, bibl. 2, illus.

Coloured illustrations of leaf symptoms and analytical data on Mg, K and Ca contents of spur leaves, shoot leaves and fruits.

1698. Démétriadès, S. D., and Holevas, C. D.
La carence de magnésium chez le murier. **(Magnesium deficiency in mulberries.)**
Ann. Inst. phytopath. Benaki, 1958, **1**: 330-1, bibl. 12, illus.

Descriptions and illustrations of leaf symptoms.

1699. Pierron, P.
Le zinc et le cuivre dans le sapin et le pommier en fonction de la nature du sol. **(The zinc and copper contents of the silver fir and the apple in relation to the character of the soil.)** [English, German and Russian summaries 8 to 11 lines.]
Ann. agron., 1958, **9**: 713-17, bibl. 8.

The Zn and Cu contents of apples are lower than those in silver firs. In the apple trunk and bark the Zn content increases with soil acidity, whereas the Cu content appears to depend on soil composition. In the leaves the Zn content is independent of the soil reaction and remains very constant. —Labs. Chim. min. Chim. biol. Fac. Sci., Lyon.

1700. Roberts, M. F., Batt, R. F., and Martin, J. T.
Studies on plant cuticle. II. The cutin component of the cuticles of leaves.
Richmond, D. V., and Martin, J. T.
Idem. III. The composition of the cuticle of apple leaves and fruits.
Ann. appl. Biol., 1959, **47**: 573-82, bibl. 27, illus., and 583-92, bibl. 16.

In the first paper the cutin contents of the cuticular membranes separated from leaves of laurel, rhododendron and *Euonymus*, and of leaf tissues of cauliflower, red beet, banana, tomato, strawberry and blackcurrant are reported. The relationship between the cutin and waxy components of the leaf cuticle is discussed, and earlier work on the development, structure and chemistry of the cuticle is reviewed. [See also *H.A.*, 30: 65.] In the second paper the levels of deposition of the waxy and cutin components of the cuticles of the mature leaves and developing fruits of Merton Worcester and Cox's Orange Pippin apples over a period of 4 months are reported. The waxy materials on the leaves remain approximately constant at 20 μg./cm.^{2}, and the cutin at about 100 μg./cm.^{2} of surface. The waxy and cutin deposits on the fruits increase markedly during the period of development, the wax and oil present on the surface and embedded within the cutin rising to 500 μg./cm.^{2} and the cutin to a little under 1,000 μg./cm.^{2} of surface. Phenolic and acidic substances in the cuticles of the fruits are determined, and the possibility of their occurrence in surface deposits on the leaves is discussed. An examination is made of the effect of nutrient deficiency upon the formation of waxy and phenolic substances in the leaves. Nitrogen deficiency in Worcester Pearmain leaves leads to a reduced deposition of waxy materials, and N, P and K deficiency results in higher contents of phenolic compounds. The separation and nature of the waxy covering on leaves, the effect of environmental conditions on its formation, and its importance in relation to the application of crop protection chemicals are discussed. [From authors' summaries. For part I, see *H.A.*, 29: 108.]—Long Ashton Res. Stat., Bristol.

1701. Friedrich, H.
Untersuchungen über die phenolischen Inhaltsstoffe von *Pyrus communis* L. V. Das Vorkommen von Gerbstoff in Birnenblättern. **(Investigations on the phenolic constituents of *Pyrus communis*. V. The occurrence of tannin in pear leaves.)**
Pharmazie, 1958, **13**: 299-305, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 11,414.

Pear leaves were found to contain 0·8–2·9% of fresh weight of a complex condensed tannin apparently consisting essentially of caffeic acid. The tannin content of the leaves of scions depended on the stock used, but was not affected by the position, relative to the stock, of the leaves on the stem. [For part III see *H.A.*, 29: 1155.]—Inst. f. KultPflForsch., Gatersleben.

Growth and physiology.

(*See also* 1528, 1628, 1692, 1726.)

1702. Kemmer, E.
Beobachtungen über den Zusammenhang zwischen Habitus und Ertrag. **(Observations on the relationship between growth habit and yield.)**
ErwObstb., 1960, **2**: 1-3, illus.

Observations on apple seedlings show that trees with a naturally spreading top tend to yield more than trees with an upright growth habit.—Inst. Obstb., tech. Univ. Berlin-Charlottenburg.

1703. Reinken, G.
Studies on the effect of the fungicide Tuzet on shoot growth and fruit of different apple varieties.
Höfchen-Briefe, 1959, **12**: 100-12, bibl. 19, illus.

An English version of the paper abstracted in *H.A.*, 30: 250.

1704. Furst, G. G.
Anatomical changes in fig seedlings during ontogenesis when grown under glass. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 33, pp. 69-73, bibl. 7, illus.

Secondary elements of the xylem and phloem appear in 2-month-old fig seedlings as a result of cambial activity. When they are 3 months old, the pericycle, sclerenchyma fibres and the premedullary zone are formed, and when they are 5 months old the pith appears. By about the 8th month the stem of the fig tree is fully developed, and starch, fats, heteroauxin and ascorbic acid begin to accumulate.

1705. Abramov, N. A.
Bark injury to apricots. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 19-31, illus.

Experiments with apricot seedlings, involving pinching out the tops, bark ringing, and planting either on a ridge or in a furrow, show that injury to the bark at ground level is mainly caused by conditions which retard the transition of the plants from the vegetative to the resting state. The selection of seedlings resistant to this form of injury can be speeded up by growing them in furrows.

1706. Barskaja, E. I., and Oknina, E. Z.
The rôle of nucleic acids in growth processes and their effect on the dormancy of fruit buds. [Russian, with English summary ½ p.]
Fiziol. Rast., 1959, **6**: 457-64, bibl. 29, illus.

The nucleic acid content of fruit buds is low in the winter, being lower the deeper the dormancy of the plant. In plants that do not enter into deep dormancy variations due to weather conditions are superimposed on those due to seasonal changes. Buds of apple trees enter into a deep dormancy in a less differentiated state and also break later than those of cherry trees and are therefore more winter hardy.

1707. Vasil'cova, T. M.
Methods of research into flower bud formation and development on apple trees. [Russian, with English, French and German summaries ¼ p. each.]
Vest. sel'skohoz. Nauki, 1959, **4**(7): 56-66, bibl. 26, illus.

The rates of development of flower and leaf primordia in fruit buds of 7 varieties of apple were investigated by means of dissection and sectioning techniques. Details are given of the appearance of the primordia from July to the beginning of the winter rest period, development during these months being divided into 7 stages. Some of the stages were not distinguishable in certain varieties, and differences of up to 50 days were recorded in the date on which a given stage was reached.

1708. Lucke, R.
Die Blühdaten topophysisch verschiedener Apfelinfloreszenzen. **(Flowering dates of several apple inflorescences in different positions on the tree.)**
Angew. Bot., 1959, **33**: 139-52, bibl. 28.

Anthesis of all the flowers on a certain type of shoot was dependent on genotypic characters and weather conditions; rootstock had little influence.

Four types of inflorescence were distinguished, and the first to flower were those on spurs. Terminal inflorescences on long shoots flowered next, followed by lateral ones on long shoots. Secondary inflorescences were the last to flower. Spur inflorescences borne on older wood flowered before those on 2-year-old wood.—Inst. Obst.- u. Gemüsebau, Hohenheim.

1709. Nath, N., and Randhawa, G. S.
Some interesting floral abnormalities in the pomegranate *(Punica granatum* L.).
Indian J. Hort., 1959, **16**: 20-2, bibl. 3, illus.

1710. Bos, J.
Wortelstelsels van fruit gewassen. (**Root systems of fruit crops.**)
Fruitteelt, 1959, **49**: 1224-45, bibl. 37, illus.

A review of work on the excavation of root systems of top fruits, vines and strawberries, and on their development.

1711. Bosse, G.
Die Wurzelentwicklung von Apfelklonen und Apfelsämlingen während der ersten drei Standjahre. (**The root development of apple clones and apple seedlings during the first three years after planting.**)
ErwObstb., 1960, **2**: 26-30, illus.

From a subterranean gallery observations on apple roots were carried out through panes of glass (50 × 100 cm.) extending to a depth of 110 cm. below the surface of the soil. Root growth was measured at 24- or 48-hour intervals. From a 5-year study (1950–55) it was concluded that the roots of apple seedlings develop very differently during their first year from the roots of older apple seedlings and from those of apple clones. Like the roots of annual vegetables, apple roots after seed germination in April showed a distinctly positive geotropism. By the end of July they had penetrated 50 cm. of soil and by the end of September all had reached a depth of at least 100 cm. During the period June–August, while root formation was practically at a standstill in apple clones, the rate of growth in roots of young seedlings reached a maximum of 16·5 mm. in 24 hours. From September to 10 October the rate declined to 6·9 mm. in 24 hours, whereas in clone M.XI the rate of root growth increased from 3·6 to 8·8 mm. during the same period. In the second and following years the root development of apple seedlings was like that of apple clones in respect of the much slower rate of growth, the periods of quiescence and active growth and the lateral spread of the system. In addition to permanent roots, short-lived, absorbing roots frequently developed, which began to rot 80–100 days after their formation, leaving empty tunnels behind in the soil. It is suggested that the latter may be a cause of soil sickness in apples.—Inst. f. Obstb., Univ. Bonn., and Gärtner. Versuchsanst. Friesdorf/Bad Godesberg.

1712. Tamási, J.
Az almafa gyökérrendszerének alakulása kötött talajban. (**The development of the root system of an apple tree in a heavy soil.**)
Kert. szöl. Föisk. Évk., 1958, **22**(6 part 1): 3-14, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 218.

An examination of a 19-year-old apple tree on a *Malus sylvestris* rootstock showed that the area occupied by the root spread was almost double that occupied by the crown spread, though 90% of the roots were located under the crown spread. Thus the root density beneath the crown was about 10 times that outside it. About 67% of the roots were found at a depth of between 20 and 60 cm., and less than 10% between 0 and 30 cm. About 26% of the roots grew vertically through a compact B horizon and 3% penetrated an Ortstein layer of the C horizon at a depth between 150 and 220 cm. [For a similar study of walnut roots see *H.A.*, 28: 3455.]

1713. Bargioni, G.
Studi e ricerche sul sistema radicale del pesco nel veronese. (**Studies and research on the root systems of peach trees in the province of Verona.**) [English summary $\frac{1}{4}$ p.]
Riv. Ortoflorofruttic. ital., 1959, **43**: 400-19, bibl. 16, illus.

Detailed studies of the root systems of peach trees in 5 different soils are reported. In general, the roots were near the surface because the top-soil was shallow, and their horizontal extension was markedly greater than that of the crown. Where a neighbouring tree or trees had been uprooted, it took many years for the roots to penetrate into the vacated soil, and, even with close spacing along the rows, the root systems of adjacent trees did not intermingle but spread into the spaces between the rows. Thus old peach orchards on shallow soils should not be replanted immediately after clearance, but used for herbaceous crops for 2–3 years.—Ist. Sper. Fruttic. Verona.

1714. Mosse, B.
The regular germination of resting spores and some observations on the growth requirements of an *Endogone* sp. causing vesicular-arbuscular mycorrhiza.
Trans. Brit. mycol. Soc., 1959, **42**: 273-86, bibl. 25, illus.

Aseptically grown apple and strawberry seedlings inoculated with surface-sterilized spores of an *Endogone* sp. have produced typical vesicular-arbuscular mycorrhiza. [From author's abstract.]—E. Malling Res. Stat., Kent.

1715. NITSCH, J. P.
Présence de gibberellines dans l'albumen immature du pommier. (**Presence of gibberellins in the immature endosperm of apple.**)
Bull. Soc. bot. France, 1958, **105**: 479-82, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 5,406.

At least 2 substances were observed having the properties of gibberellin.

Pruning and training.

(*See also* 1653, 2556, 3051.)

1716. JOHANSSON, E.
Beskärningsförsök med äpple vid Alnarp. (**Pruning trials with apples at Alnarp.**) [English and Esperanto summaries ½ p. each.]
Medd. Stat. Trädgårdsförs. Alnarp **123**, 1959, pp. 10, bibl. 4, illus.

For a report on the first 10 years of this trial, which was started with 7 apple varieties in 1938, see *H.A.*, 18: 1642. The present paper gives an account of the continuation of the trial with 5 varieties until 1958. The following methods of pruning were compared: moderate (a), hard (b), light (c), winter and Lorette pruning (d). Differences in tree growth between the treatments were largely equalized during the last 10 years. None of the pruning methods tested prevented biennial bearing in Laxton's Superb or Mère de Menage, but in on-years hard pruning (b and d) increased fruit size. Lorette pruning (d) decreased yields, especially in late varieties, but in some years it improved fruit quality. Differences in yield, which had been important during the first 10 years, were small during the second period. In most cases growers are advised to prune moderately (a).

1717. HILKENBÄUMER, F.
Einfluss der Kronenerziehung bei Apfelbäumen. (**The effects of training the tops of apple trees.**)
ErwObstb., 1960, **2**: 3-7, bibl. 1, illus.

In trials carried out at Klein-Altendorf for 5 years [see *H.A.*, 30: 161], apple spindle bushes with laterals tied horizontally proved distinctly superior to severely pruned spindle bushes in respect of the age at which bearing began and of yields and fruit colour. In the trees with tied branches vigour was maintained by pruning the extension growth of the limbs and by other means. Almost without exception spindle bushes showed better fruit colour and higher yields than espalier trees. If, however, apple espaliers are desired for special reasons, the limbs should be tied at an angle of less than 90 degrees.—Inst. Obstb., Univ. Bonn.

1718. HILKENBÄUMER, F.
Durchführung des Fruchtbogenschnittes bie Apfelbäumen. (**The arcure method of pruning apple trees.**)
ErwObstb., 1960, **2**: 24-6, bibl. 2, illus.

Illustrated instructions on the training and arcure pruning of young apple spindle bushes are followed by tabulated data recording the time required for tying down the shoots of and pruning 5 apple varieties in their second to fourth years. Arcure pruning requires less labour than the customary method used on spindle bushes.—Inst. Obstb., Univ. Bonn.

1719. ČERNÝ, L.
Der Verjüngungsschnitt alter Apfelbäume. (**The rejuvenation of old apple trees by pruning.**)
Dtsch. Gartenb., 1959, **6**: 248-51, bibl. 10, illus.

Fertility was restored to old apple trees by various treatments involving different degrees of rejuvenation pruning. Allowing for the time required for the build-up of the rejuvenated top, the least severe of the pruning methods used was the most economical. Data are presented on the effects of different treatments on leaf size and yield in different years.—Inst. Fruit Res., Holovousy, Czechoslovakia.

1720. DONSKIH, N. P.
Biological factors affecting the productivity of apple trees. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 39-43.

The yields of 3 varieties of apple over a 10-year period are analysed with reference to the branch spread of the tree. Under the conditions of this investigation the greatest yields per unit area of spread were obtained when the trees were 14–17 years old. After this, periodical rejuvenation by pruning is recommended to limit the size of the tree to 4–5 m. in height and 6–8 m. in width. If tree size is limited in this way, trees can be spaced 7 m. × 7 m. apart instead of the usual 10 m. × 10 m.

1721. GEL'FANDBEJN, P. S.
The problem of pruning to increase the winter hardiness of apple trees. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 34-8, bibl. 2.

Excessive cropping, resulting in lack of growth, reduced winter hardiness. Pruning and fertilizer applications should be regulated to achieve a balance between growth and fruiting. To achieve higher yields per hectare closer planting is recommended in preference to increasing the crop per tree.

722. Vasil'čenko, G. V.
The regeneration of apple roots in the Altai. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(8): 35-8, illus.

n a forest steppe region of Siberia apple roots were runed at 10-day intervals from the end of April ntil the ground froze. Late pruning and pruning f thick or deep-lying roots all resulted in poor egeneration. It is concluded that orchards should e ploughed in early May, not deeper than 10–15 m., and that during the summer weeds should be ontrolled by shallow cultivation.

723. Uitterlinden, L.
Vormsnoei bij perespillen. **(Formation pruning of pear spindle bushes.)**
Fruitteelt, 1960, **50**: 39.

bservations on the growth of pear trees in spindle ush form have led to the following recommenda-ions. Pear trees cannot be treated in exactly the ame way as apples, owing to their different habits f growth. Varieties can be divided into 2 groups. roup 1, in which the growth of the main stem is igorous and that of the laterals is weak, includes ardy, Comice, Légipont and Bonne Louise. roup 2, in which the main stem is less, or not at ll, dominant, includes Précoce de Trévoux, riomphe de Vienne, Conference and Alexandre ucas. In group 1 the two strongest laterals (pre-erably the uppermost ones) should be chosen as e lowest fruiting branches. In group 2 the terals chosen as fruiting branches should also be rong, but the two uppermost laterals should be emoved. These fruiting branches should not be ed down before they are sufficiently sturdy; in roup 1 branches should be bent down in winter, nd in group 2 in summer. In general, the angle etween the main stem and the bent branches hould not be more than 60°, but the relative igour of the branches and stem can be regulated y the degree of bending or by pruning back the ain stem.

724. Renaud, M.
La taille des arbres fruitiers à noyau. **(Pruning stone fruit trees.)**
[Publ.] Soc. Hort. Algér., 1959, pp. 39, bibl. 3, illus.

each, apricot, plum, almond, cherry.

725. Wagner, S.
Formarea coroanei pomilor la sîmburoase în primul an de creștere a altoiului. **(Framework pruning of stone fruit trees in the first year of scion growth.)** [English, French, Russian and German summaries ½ p. each.]
Grăd. Via Liv., 1959, **8**(7): 36-8 + summaries, illus.

lum and apricot varieties are listed, which, under roper cultural conditions, grow rapidly enough r a framework to be formed in the first year.

1726. Ionova, M. A.
Winter hardiness of flower buds of apricot in relation to growth processes. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 64-7.

Flower bud differentiation in apricots usually takes 45–65 days, according to variety, and in unpruned trees it is completed in September. Summer pruning delays the start of this process by up to 20 days; hence differentiation is not completed before the winter sets in and the buds are hardier. The best time for pruning was June.

1727. Smirnova, A. A.
Training cherries in a prostrate form. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 53-6, illus.

In order to enable less winter-hardy varieties of cherry to be grown in Siberia, the trees were trained into a prostrate form by bending their main branches down to soil level. In winter the trees were covered with evergreen branches or potato haulms, and were further protected by the snow cover. Such trees started to crop early but declined after 20 years.

1728. N.S.W. Department of Agriculture, Division of Horticulture.
Central wire bracing for fruit trees.
Agric. Gaz. N.S.W., 1959, **70**: 365-6, illus.
Fruit World, Melbourne, 1959, **60**(9): 31.

Eye screws or staples driven into the inner sides of the main limbs enable a 12-gauge wire harness to be attached and gathered together in a central ring. This wire bracing prevents breakage of limbs during years of heavy crops. The work is best carried out during dormancy.

Pollination and fruit development.

(*See also* 1500, 1631, 1632, 1656.)

1729. Teterev, F. K., and Mel'nikova, K. D.
The problem of pollination and fruiting of plums. [Russian.]
Agrobiologija, 1959, No. 6, pp. 867-73, illus.

Russian varieties of plum are classified as self-fertile, partially self-fertile or self-sterile. Cherry plums and sloes were nearly always self-sterile. Artificial pollination, with pollen from other trees of the same variety, increased fruit set of some self-fertile varieties, in comparison with open pollination and artificial pollination with pollen from the same tree. Artificial cross-pollination with different pollinating varieties affected fruit set and fruit size independently.

1730. Luckwill, L. C.
Gibberellic acid can save pears.
Grower, 1959, **52**: 451-3, illus.

In 1958 gibberellic acid sprays resulted in parthenocarpic fruit set in Miller's Seedling apple trees. In a large-scale trial in 1959 GA at 50 p.p.m. was sprayed on emasculated apple and pear trees at petal-fall. Results with apples were not satisfactory, because only on Miller's Seedling, out of 6 varieties, did the parthenocarpic fruits survive June drop and develop to maturity. Trees of both Laxton's Superb and Williams' pears set seedless fruit after GA sprays. More fruit was set with GA alone than with GA plus 2-naphthoxypropionic acid, but no fruit was set without sprays. The GA sprays had no effect on the shoot growth of either apples or pears. The results suggest the possibility of using GA to induce fruit set on pears after the blossom has been damaged by frost.—Long Ashton Res. Stat., Bristol.

1731. Tukey, L. D.
Periodicity in the growth of fruits of apples, peaches and sour cherries with some factors influencing this development.
Bull. Pa agric. Exp. Stat. **661**, 1959, pp. 21, bibl. 33, illus.

Enlargement of apple, peach and sour cherry fruits occurred mainly at night. In the daytime, particularly before noon, shrinkage or only very small increases were noted. Rate of enlargement seemed to be related to moisture stress in the tree, being decreased by rapid transpiration conditions and low soil moisture. Bagging fruits in polythene to reduce water loss did not prevent shrinkage but caused russeting of the skin.

1732. Roemer, K.
Voraussichtliche Grössenzunahme von Früchten der Sorten Golden Delicious und Martini bis zur Ernte. **(Probable increases in fruit size up to the time of harvesting in the apple varieties Golden Delicious and Martini.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 206-7.

Data on rate of fruit growth for 1957 and 1959, on final fruit size for 1957 and on predicted fruit size for 1959.

1733. Buscaroli, A.
Pesche gemelle. **(Twin peaches.)**
Inf. fitopat., 1959, **9**: 206-7, illus.

Vigorous young trees of the varieties Bella di Cesena, Bella di Roma and particularly Hale may produce twin, triplet or quadruplet peaches from a single flower. The survivors, even if only one, are deformed. Conditions favouring the abnormality are high rainfall, light intensity and temperature during the flowering period, and slow-draining soil. It is not unlikely that a genetical factor resulting in parthenocarpy is involved, especially in the self-sterile variety Hale. If this theory is confirmed, the production of multicarpellary fruits could probably be checked by planting suitable pollinators among these varieties and by selecting scions from individuals with only normal flowers.

1734. Eaton, G. W.
Twin ovules in *Prunus avium* L.
Canad. J. Bot., 1959, **37**: 1203-5, bibl. 9, illus.

Occurring in 5–12% of Windsor sweet cherry pistils, apparently by the differentiation of separate nucelli in a single primordium.

1735. Son, C. H.
A microscopic study of the structural changes of peaches and pears during softening.
Diss. Abstr., 1959, **20**: 1316, being *L.C. Card No. Mic.* 59-3601 of 102 pp.

Studies during ripening on the tree and storage softening.

Spraying to regulate cropping.

1736. Bouhier de l'Écluse, —.
Contribution à l'étude de l'éclaircissage chimique des arbres à pépins. **(Contribution to the study of the chemical thinning of pome fruit trees.)**
C.R. Acad. Agric. Fr., 1959, **45**: 376-81.

Preliminary trials during 1952–55 led to the rejection of naphthaleneacetic acid as a chemical thinning spray, because it caused serious scorch especially when used at full blossom. In 1956 naphthalene acetamide (NAAM) was applied at 60 p.p.m. active ingredient (300 c.c. commercial product per hl. water plus spreader per tree) to 6 apple varieties 10–15 days after full blossom, and caused a considerable drop of fruitlets about 2 weeks later. The best results were obtained with Reinette Clochard, Reinette du Mans and Golden Delicious. With Golden Delicious on Malling II the yield per tree and mean fruit weight were 170 kg. and 170 g. respectively in the treated trees compared with 168 kg. and 140 g. in the controls. In 1957 the crop was lost through frost. In 1958 NAAM was applied at 300 and 450 c.c. per hl. per tree to 3 varieties 12 days after full blossom. Good results were obtained, especially with Reinette du Mans and Golden Delicious. With the latter the yields per tree were 182 kg. in the control, 160–200 kg. with 300 c.c., 180 kg. with 450 c.c. and 185 kg. with hand-thinning; the largest fruits were obtained with the 450-c.c. and hand-thinning treatments. Except for the control trees, Golden Delicious flowered abundantly in 1959. It was concluded that with Reinette du Mans, Reinette Clochard and Golden Delicious the NAAM treatment not only ensured a satisfactory yield but overcame biennial bearing.—Stat. Rech. fruit. Sologne.

1737. Greenhalgh, W. J.
Hormone sprays in fruit growing.
Agric. Gaz. N.S.W., 1959, **70**: 225-36, illus.

Present uses are reviewed. Recommendations ased on field tests are given for fruit setting in urrants, chemical thinning of apples and stone ruits, and the regulation of fruit size and maturity n pineapples and stone fruits. NAA is recommended for apple thinning. With stone fruits esults with several chemicals such as naphthylhthalamic acid and DNC were less consistent. ecommendations are made for the control of re-harvest drop in pome fruits and citrus, and on he rooting of cuttings. Tables showing suitable prays, strengths and times of application are ncluded.

738. RAKITIN, JU. V., AND GEJDEN, T. M.
Reduction of pre-harvest drop of apples and pears in the Crimea. [Russian.]
Fiziol. Rast., 1959, **6**: 484-6, bibl. 4.

IAA and its potassium salt at 0·001% and 2,4,5-P at 0·002% applied 11–17 days before harvest ffectively reduced pre-harvest drop in 4 apple and pear varieties. Some differences in varietal eaction to the treatments were noted. Although ,4,5-TP was slightly better than NAA and its K alt, which showed similar effectiveness, the use of ie K salt of NAA is recommended, as it has been nore fully tested.

Fruit composition.

(*See also* 1535, 1700, 1764, 1818.)

739. ROOTSI, N., AND FERNQVIST, I.
Schwankungen des Askorbinsäuregehaltes bei einzelnen Apfelsorten auf Grund von Analysen, durchgeführt 1952–1957 in Alnarp. **(Fluctuations in the ascorbic acid content of individual apple varieties, as determined by analyses carried out at Alnarp in 1952-57.)**
Acta agric. Scand., 1959, **9**: 299-320, bibl. 21.

he apple varieties examined were arranged in the ollowing order according to their relative ascorbic cid (AA) content, calculated on a mean value for ie varieties Ribston, Cox's Orange and Ingrid Iarie during the years 1952-57: Cox's Pomona 57%, Belle de Boskoop 150%, Cortland 127%, ibston 127%, Cox's Orange 99%, Ingrid Marie 5%, Laxton's Superb 71%. Over the 5 years ibston, Cox's Orange and Ingrid Marie had an verage AA content of 13·5±1·2 mg. (100%) in ie autumn. The mean error of 1·2 mg. (8·9%) ggests that in view of the considerable variations etween years not even 5 years suffice to obtain a ompletely reliable mean value. However, in the ght of the gradual and regular decrease in the AA ontent during storage (11·5±0·8 mg. in winter nd 10·6±0·8 mg. in spring) a mean value of 3·5±1·2 mg. appears acceptable. The parallel ourse of the AA content curves of different arieties also supports the reliability of the value. 1952 and 1953 the AA content varied a great eal as the fruit samples came from several regions, the variability coefficient being about 20%. In the following years the material was of more uniform origin, and the variability coefficient was about 10%. In fruits taken from manurial trial plots the seasonal fluctuations in AA content were similar to those in fruits from varietal plots. AA contents and the curves recording rainfall in the months of June + July and August + September showed a positive correlation at the beginning and a negative correlation at the end of fruit development. On a sandy soil K fertilizers caused a reduction in AA content of 21% (average of 4 years). The effect of N varied, but on the whole it depressed the AA content (by 10·4% on an average of 4 years). P had little influence on AA content. Within a variety an increase in the red fruit colour was accompanied by an increase in the AA content (correlation coefficient + 0·946), while increases in fruit weight and size were associated with a drop in the AA content (correlation coefficient − 0·613). An increase in titratable acid, calculated as malic acid, was accompanied by a higher AA content. The relationship between the soluble dry matter content of the fruit and the AA content was not clear.

1740. POAPST, P. A., ALLENTOFF, N., AND PHILLIPS, W. R.
Ascorbic acid trends in McIntosh and Cortland apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 14-16.

Analysis at various times during storage under varying temperatures and gas mixtures has shown: (1) The ascorbic acid content of fruit stored at 55° F. for 2 months fell drastically and then became stabilized. In McIntosh the content dropped to 1 mg. from the original 4 mg. per 100 g. tissue, and in Cortland it dropped over 80% from the original 14 mg. The apples remained white for several months, suggesting that at 55° antioxidant requirements are very low. (2) In McIntosh stored at 40° the ascorbic acid content slowly and steadily declined to 50% of the harvest value after 8 months' storage. This temperature appeared marginal for browning disorders. (3) McIntosh held at 35°, 32° and 30° suffered only temporary losses of 20%, and quickly reached a stable condition. In a late stage of storage ascorbic acid concentrations rose slightly, and Cortland held at 32° and 30° steadied at 60% of the original concentration. (4) Original ascorbic acid concentrations in core tissues were 2 and 7 mg. per 100 g. of core tissue for McIntosh and Cortland respectively. In storage at 55° core tissue concentrations declined only 50%, and were eventually higher than the concentration in the whole apple. Cortland core concentrations at 30° and 32° dropped by 33% but then became stabilized. McIntosh cores at similar temperatures showed a rise of up to 65%, and this is considered to be an adjustment to prevent browning. Browning did, however, develop in McIntosh, but not in Cortland, which maintained an ascorbic acid core concentration of above 5·5 mg. (5) Core and cortex ascorbic acid concentrations of McIntosh stored in gas at 39° F. were roughly proportional to oxygen concentrations. Core flush was substantially reduced at 39°, as opposed to 32°; it was further reduced by lower oxygen concentrations.—Centr. exp. Fm, Ottawa.

1741. Serini, G.
La prematurazione dei prodotti ortofrutticoli. **(Artificial ripening of fruit and vegetables.)**
Progr. agric., 1959, **5**: 1394-9, illus.

Changes in composition are recorded for apples, lemons, oranges and mandarins harvested in the green state and ripened by 100 hours' treatment in a ventilated chamber containing a mixture of oxygen and nitrogen (the former above atmospheric percentage) at 20–25° C. and R.H. 85–95%. Colour changes in pears and tomatoes under the same treatment are illustrated.

1742. Nikitina, K. V.
The phytoncidal characteristics of Antonovka apples. [Russian.]
Sb. nauč. Rab. Leningrad. In-t sov. Torgovli, 1957, No. 11, pp. 39-49, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,387.

A study was made on the phytoncidal activity of 2 apple varieties in relation to time of harvest. It was found that strains of Antonovka gradually lose their phytoncidal activity and also their activity against protozoa during maturation and storage. The potency of the volatile fractions of phytoncides was weaker than that of the liquid fractions with respect to bacteria, fungi and protozoa. As the Antonovka strain known as 600 Gramme was less phytoncidal than Common Antonovka its improvement by selection is considered necessary.

1743. Li, K. C.
Occurrence of leuco-anthocyanin in sour and sweet cherries.
Nature, 1959, **184**: 1935, bibl. 4.

Leuco-anthocyanin was demonstrated in the derived form of cyanidin in green and yellow fruits of Montmorency, Windsor and Yellow Glass. The sour cherries contained 5–6 times as much as the sweet. As the fruits matured the content of cyanidin decreased in all cases.—Cornell Univ., Geneva, N.Y.

1744. Van Buren, J. P., Scheiner, D. M., and Wagenknecht, A. C.
An anthocyanin-decolorizing system in sour cherries.
Nature, 1960, **185**: 165-6, bibl. 7.

Figures are given for decolorizing ability and anthocyanin accumulation in maturing Montmorency and English Morello cherries from May 29 to August 19.—Cornell Univ., Geneva, N.Y.

1745. Reeve, R. M.
Histological and histochemical changes in developing and ripening peaches. III. Catechol tannin content per cell.
Amer. J. Bot., 1959, **46**: 645-50, bibl. 17.

Calculations of the amount of naturally occurring catechol tannins in developing and ripening peaches revealed very large changes in these substances per cell. Catechol tannins increased about 90-fold from the beginning of cell enlargement until the fruit was slightly over half its mature size, a period of about 16-fold increase in volume of the average cell. After a maximum tannin content had been reached, a decrease of about 8-fold per cell was found as the fruit matured and ripened. The early changes in tannin content, when expressed on a unit volume basis, were much less pronounced (about 5-fold increases) and agreed in general with published chemical data for increases in chlorogenic acid on a weight basis during a comparable growth period in a sweet cherry. The semi-quantitative, per-cell expressions of these histochemical results show a relationship to established phenomena of growth. [From author's abstract. For part II, see *H.A.*, 29: 3284.]—W. reg. Res. Lab., U.S.D.A., Albany, Calif.

Harvesting, packing and marketing.

(*See also* 1604, 1765, 1937, 3076.)

1746. Fridley, R. B., and Adrian, P. A.
Development of a fruit and nut harvester.
Agric. Engng St. Joseph, Mich., 1959, **40**: 386-7, 391, bibl. 5, illus.

Some of the theoretical considerations behind the design of the Californian harvester [see *H.A.*, 29: 150 and 30: 259] are set forth. The forward rubber roller which assists both pick-up and elevation now has rubber fingers. The machine, originally designed for prunes, will also deal with walnuts and figs. With flat varieties of almond the smooth pick-up roller is replaced by a small brush.

1747. Steynor, R. L.
Home-made equipment cuts costs.
Grower, 1960, **53**: 276-9, illus.

Various types of step ladder and wheeled platform made by a grower from slotted angle alloy for fruit picking and other orchard operations.

1748. McMechan, A. D., and Morton, W. F.
The bulk bin method of handling fruit in British Columbia.
Publ. Canada Dep. Agric. Res. Stat. Summerland **12**, 1959, pp. 30, bibl. 1, illus.

Bin construction and handling, based on experince with a standard pallet bin holding 25 loose oxes of apples, are described, together with studies f bruising and stem puncturing of apples and ears and of bulk handling peaches. Orchard ıanagement, marketing and packing house con-ersion are also considered. [See also *H.A.*, 9: 3309b.]

749. Padfield, C. A. S.
Picking dates for Granny Smith are important.
Orchard. N.Z., 1959, **32**: 285.

igures are given which show increased super-cial scald with early picking of Granny Smith. larvesting should not start until the third or ourth week of April.—D.S.I.R., Havelock North.

750. Whittaker, E. C.
Storage of apples. Importance of harvesting maturity.
Agric. Gaz. N.S.W., 1959, **70**: 237-41, illus.

hree mechanical aids to maturity determination, z. the colour chart, the penetrometer or pressure ster, and the iodine test, have limited value, and orage life still largely depends on the grower's xperience and judgement concerning the correct me to pick.

751. MacGregor, D. R., and Atkinson, F. E.
Studies in maturity of peaches for canning.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 30-1.

he relationship of flesh colour to skin colour and ıe number of days required to reach canning aturity were investigated in Vee peaches. Fruit f varying maturity was graded by skin colour ıd Hunter readings of the flesh and colour photo-aphs of the flesh and skin were taken. The fruit as then ripened to optimum canning maturity at)° F., and photographs and Hunter readings ken before canning. In a peach picked 4-6 days efore canning maturity the flesh was yellow, and -8 days before maturity it was beginning to lose s green colour. The Hunter reading for the esh of a 6-day peach, for which a definite colour ın be obtained, was —6·2.—Res. Stat., Summer-nd, B.C.

752. Morris, J. R.
A specially designed picking box [for peaches].
Ark. Fm Res., 1959, **8**(3): 8, illus.

he box, half the size of the standard field box, is × 9½ × 10 in. and is made from light-weight ıeet metal. Stacking is possible since a slight per enables the bottom to fit on to metal braces elded inside each corner. In picking, a special ırness, which snaps into slots on each side, is used. ompared with the standard field box it reduced uising by more than half during both harvest ıd subsequent storage.

1753. Anon.
Prepacking fruit at East Kent Packers in plastic netting.
Produce Packaging, 1959, **5**(8): 32, illus.

Machine and organization described briefly.

1754. Seary, P. G.
Prepacking apples will achieve bigger sales for growers.
Produce Packaging, 1959, **5**(9): 16, 22.

The 2 basic methods are reviewed, viz. bagging, e.g. in polythene bags, and packing into trays, forms and moulds. Details are given of the various packing devices available to growers.

1755. Niebel, B. W., and others.
Improving methods of packing apples in consumer packs.
Bull. Pa agric. Exp. Stat. **639**, 1958, pp. 21, illus.

Costs are compared of packing apples in consumer-size bags by hand and by 4 types of bagging machine commonly used in Pennsylvania. As a result of time and motion studies improvements have been developed in the operation of each method.

1756. Anon.
"Float"-packing.
Citrus News, 1959, **35**: 86, illus.

A machine is described which packs apples in moulded trays at up to 80 bu. cases per hour.

1757. Podany, J. C.
Costs of packing Michigan peaches in 1957.
Mktg Res. Rep. U.S. Dep. Agric. **290**, 1958, pp. 25, 20 cts.

Total Michigan peach production in 1957 was approximately 3 million bushels, 75% of these coming into the fresh fruit market, 20% being canned and 4% frozen. The cost data examined are based on observations in 5 central and in 20 farm packing sheds. Previous studies had indicated that large well-managed packing sheds showed lower packing costs than farm sheds, but the reverse held good in the present studies. Among possible reasons for this are the facts that central sheds sometimes operated at much less than their potential capacity and that there was thus less waste of labour entailed in the farm sheds where there was no difficulty in shifting labour to other tasks. The average time taken to pack a bushel proved to be 18·5 man minutes in the central and 13·8 m. m. in the farm sheds. Labour costs per packed bushel were 33·3 cts. in the central and 22·9 cts. in the farm sheds. Overhead costs per packed bushel were 15·2 cts. in the central and 13·5 cts. in the farm sheds. Material costs, including basket, lid, liner, pad and fringe, were about 56·2 cts. per bushel.

1758. TOLLE, W. E.
Protection of paper-packaged fruits and vegetables displayed on ice.
Mktg Res. Rep. U.S. Dep. Agric. **293**, 1958, pp. 8, illus., 5 cts.

The results of tests with 15 kinds of cover, for placing over the ice to prevent packages of fruits and vegetables from becoming water-soaked, showed polythene sheeting to be the most satisfactory, despite its tendency to creep forward on the ice. It nearly eliminated water damage to the package and caused a rise of only 4° F. over the temperature of packages displayed on kraft paper. A 2-mil. polythene ice cover is recommended.

Storage.

(*See also* 1584, 1604, 1735, 1740, 1742, 1749, 1750, 3042.)

1759. BREDELL, C. H., SWANNACK, J. S., AND KUTTEL, B. W.
The construction of fruit cold storages for farms. 1. Construction. 2. Practical experience. 3. Design of cold stores.
Dec. Fruit Gr, 1959, **9**: 308-15, illus.

The first author discusses requirements of size, site, construction and operation; the second author describes 2 single-room cold stores; and the third deals with dimensions, capacity and costs.

1760. MARINO, A.
I frigoriferi rurali. **(Rural cold stores.)**
Frutticoltura, 1958, **20**: 257-60; 1959, **21**: 41-51, and 607-11, illus.

General considerations, plans for buildings to hold 12–70 metric tons, and electrical installations for these, with brief notes on costs.

1761. MANN, G.
Cold stores for fruit and vegetables.
Agriculture, Lond., 1959, **66**: 284-9, illus.

Some of the newer materials for insulating stores are mentioned, and expanded polystyrene is recommended for this purpose. The importance of vapour proofing to prevent condensation within the insulation is stressed. The use of ethanolamine solution as a CO_2 absorbent has the advantage that, when exhausted, it may be regenerated by heating to drive off CO_2, and the scrubbing process can be made automatic.—Ditton Lab., Kent.

1762. GAC, A.
Réglage de l'humidité relative dans les chambres de conservation de fruits. **(Regulation of relative humidity in fruit storage chambers.)**
Ann. Soc. nat. Hort. France, 1959, **5**: 644.

Replacement of moist by dry air during the latter part of the storage period should improve the flavour of stored fruit without excessive loss of weight. In non-ventilated cold stores the fruit will lose weight unless the battery fluid and surface area are adjusted to the fruit load. The air in ventilated fruit stores should be moistened before it enters.

1763. CHARLEY, V. L. S.
The prevention of microbiological spoilage in fresh fruit.
J. Sci. Food Agric., 1959, **10**: 349-58, bibl. 38.

A review, including details of micro-organism counts on harvested fruit and methods to reduce their development.

1764. LE GOUPILS, P.
Fumigations insecticides et effets secondaires. **(Insecticidal fumigations and their side effects.)**
Rev. Agric. Brux., 1959, **12**: 711-14.

A general account of the chemical changes induced in stored foods, including fruits, by the action of fumigants in current use.

1765. FISHER, D. V.
Cooling rates of apples in new cardboard containers vs. standard wood boxes.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, p. 6.

Indications are that fruit cools as well or even slightly better in cardboard, provided adequate spacing is provided to allow air circulation. A comparison between boxes placed close together and spaced apart has shown that apples in the former took 13 days to cool from 50° to 32° F., and in the latter only 6 days.—Res. Stat., Summerland, B.C.

1766. DEWEY, D. H., RAPHAEL, H. J., AND GOFF, J. W.
Polyethylene covers for apples stored in bushel crates on pallets.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 197-209, bibl. 3, illus.

Moisture losses were considerably reduced by polythene covers, which are therefore recommended for varieties susceptible to shrivelling, such as Golden Delicious and Red Steele. Polythene liners in bulk boxes, while reducing weight loss, caused deterioration of quality owing to higher temperatures and spoilage by moulds. The preservatives tested reduced spoilage but did not prevent it.

1767. SÄKÖ, J.
Omenien varastoimisesta alhaisessa lämpötilassa. **(Cold storage of apples.)** [English summary ⅓ p.]
Maataloust. Aikakausk., 1959, **31**: 191-7, bibl. 12, illus.

In one year's trials temperatures of −1° C. and +4° C. were compared for the storage of 4 apple varieties. From the point of view of firmness of texture the lower temperature proved preferable in all cases. Fungal wastage was low, owing to the dry growing season (1958). Weight loss was a little smaller at $-1°$ C., but at that temperature 5·5% and 3% of freezing injury occurred in the fruits of Wealthy and Åkerö respectively.—Agric. Res. Centre, Dep. Hort., Piikkiö.

1768. Landfald, R.
Lagring av Prinsar. **(The storage of Prinsar apples.)**
Frukt og Baer, 1959, **12**: 25-8, bibl. 1, illus.

Storage at 2° or 2·7° C. is recommended for keeping this variety until December.

1769. Nikitina, K. V.
The keeping quality of apples. [Russian.]
Sad i Ogorod, 1959, No. 9, pp. 56-9.

No consistent relationship was established between skin thickness and keeping quality of apples.

1770. Mezzetti, A.
Considerazioni sul meccanismo che genera le spaccature delle mele senescenti. **(Observations on the causal mechanism of cracking in over-ripe apples.)**
Frutticoltura, 1959, **21**: 631-3, bibl. 10, illus.

Microscopic examination showed that dissolution of the intercellular pectic membranes of Reinette du Canada apples allowed excessive swelling and separation of the pulp cells, the resulting pressure cracking the fruit skin. Cracking in stored apples could be prevented by reducing the intensity and duration of the yellowing process and by keeping the humidity of the cold store relatively low.

1771. Phillips, W. R.
The jacketed storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 6-8.

Jacketed room at Smithfield Horticultural Substation: Average temperatures at various points within the room are given. After 6 months' storage the average apple weight loss was 2·7%. A comparison between conventional, gas and jacketed storage of McIntosh for the same period has shown that, whereas texture and flavour were much the same, rot was markedly reduced in jacketed, and core flush in gas storage. Some preliminary observations on the use of the room as a gas store are provided. *Commercial jacketed gas storage at Picton, Ontario:* The unit consists of 58,000 cu. ft. of refrigerated and 31,000 cu. ft. of unrefrigerated space. Estimated costs for jacketed storage were higher than for conventional gas storage, but a reduction in costs for jacketed storage is considered possible.—Centr. exp. Fm, Ottawa.

1772. Fisher, D. V.
Controlled atmosphere storage tests with McIntosh.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, p. 1.

In an experimental trial a 5/3 mixture of CO_2/O_2 at 34° F. gave better results than a 7/14 mixture at 38°. Core flush was controlled at both temperatures in both atmospheres, and scald, which occurred mainly at 38° in the 7/14 mixture, was eliminated by a diphenylamine dip. No external CO_2 injury occurred. In commercial trials, with fruit from different areas held at 35° and in 5/3 and 7/14 gas mixtures, extensive losses due to CO_2 injury resulted, especially with longer storage in the 7/14 mixture. However, fruit of medium size and from orchards showing good colour and maturity was less affected than larger fruit from overstimulated orchards. No difference in firmness was found between control and gas storage lots, and gas storage controlled core flush. [See also *H.A*,, 29: 2179.]—Res. Stat., Summerland, B.C.

1773. Phillips, W. R., and Poapst, P. A.
The influence of seeds on core flush.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 9-10.

Inoculation of apples with stratified seeds increased core flush in one case. In another case extracts from such seeds appeared to increase the amount of breakdown. McIntosh inoculated with IAA, then stored for 4 months and ripened, had a core flush index of 53 compared with 25 for untreated apples. In one sample 14 fruits which were misshapen owing to poor pollination were all affected by core flush, and in each case the flush occurred on the large side of the fruit. In apples removed from storage flush development was related to oxidase activity. [For earlier work see *H.A.*, 28: 173.]—Centr. exp. Fm, Ottawa.

1774. Poapst, P. A., and others.
The relation between auxins and core flush.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 10-12.

Volatile emanations from McIntosh seeds were found to be insufficient to cause toxicity; likewise the diffusable auxin content of seeds, which increased to a maximum in March when core flush began to appear in substantial amounts, is considered insufficient to cause tissue destruction. Testing of seeds extracted from McIntosh ripened after removal from storage has shown that, as the period of ripening increased (up to 7 days), the percentage core flush also increased and the growth regulating effect, as measured by root initiation of bean cuttings, decreased.—Centr. exp. Fm, Ottawa.

1775. Poapst, P. A., and Phillips, W. R.
The influence of maleic hydrazide on the keeping quality of McIntosh apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 12-13.

Trees were sprayed with 500 and 1,000 p.p.m. of MH 18 days before harvest and the fruit was subsequently stored at 30° F. After 6 months' storage the highest MH concentrations recorded were 2·8 p.p.m. in the skin and 0·6 p.p.m. in the pulp for the 500 p.p.m. treatment. For the stronger application the figures were 6·0 and 0·6 p.p.m. respectively. The lower application increased core flush without affecting cortical breakdown or fungal rot, whereas the higher application reduced core flush and appeared to reduce breakdown and rot. Germination of seed removed from apples sprayed with the 1,000 p.p.m. solution was sharply reduced.—Centr. exp. Fm, Ottawa.

1776. Phillips, W. R.
Irradiation of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 16-17.

Low radiations of 10–50,000 rep. on McIntosh, Cortland and Lobo apples reduced seed germination, but higher levels (500,000 rep.) were required to kill the seed. No significant difference in seed germination was found using levels between 50,000 and 300,000 rep. Apple tissue was noticeably damaged at or above 200,000 rep. Damage was associated with cellular breakdown as indicated by the production of soluble pectins, the levels of which are noted for different radiation levels, a significant increase in pectin being found above 200,000 rep. Towards the end of the storage period radiation was found to have significantly reduced core flush, which occurred only in McIntosh, and it is suggested that this may be associated with the effect of radiation on seed germination. Irradiation also reduced the ascorbic acid content, the development of scald in Cortland and the growth of micro-organisms on the surface of inoculated apples.—Centr. exp. Fm, Ottawa.

1777. Phillips, W. R.
Scald control in commercial CA storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 4-5.

A 7% CO_2 plus 14% O_2 mixture was more conducive to scald than a 5/3 mixture, but scald developed when apples from the latter mixture were subsequently held beyond 3 weeks in ordinary storage.—Centr. exp. Fm, Ottawa.

1778. Stoll, K.
Das Problem der flüchtigen Ausscheidungen bei der Hautbräune kaltgelagerter Äpfel. **(The problem of volatiles in relation to scald of apples in cold storage.)**
Reprinted from *Kältetechnik*, 1959, **11**: 400-3, bibl. 12.

Volatiles from individual apple varieties induced scald in susceptible varieties. The volatiles of susceptible varieties induced more severe symptoms of scald than those of resistant varieties. The mixed cold storage of susceptible and resistant varieties has shown that the presence of one susceptible variety may increase scald symptoms in another susceptible variety. When a resistant variety was added, scald was reduced in the susceptible variety in 7 out of 9 cases. On the other hand, scald was induced in varieties considered resistant, if they were stored in very close contact with susceptible varieties. Whether volatiles induce scald or not appears to depend on their chemical nature, on their concentration and on the duration of their action. Thus, the problem of volatiles seems to have a qualitative, a quantitative and a time aspect. However, the resistance of the fruit skin, which varies with its structure, its composition and its physiological age, appears to be of equal importance.—Eidg. Versuchsanst., Wädenswil.

1779. Fisher, D. V.
Diphenylamine for controlling scald in Delicious and Stayman apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 5-6.

A pre-storage dip of DPA at 100 p.p.m., plus 5% isopropyl alcohol to increase solubility, gave complete control of scald in immature fruit during storage for 7 months at 32° F.; untreated immature fruit showed severe scald. Both treated and untreated mature fruit did not show the disorder. DPA did, however, cause the development of black irregular areas of injury, especially with mature fruit. This injury is considered to be due to retention of excess dip; inclusion of a wetting agent should overcome this.—Res. Stat., Summerland, B.C.

1780. Padfield, C. A. S.
The use of diphenylamine and other chemicals to control superficial scald of apples.
N.Z. J. agric. Res., 1959, **2**: 953-70, bibl. 7, illus.

Superficial scald was controlled in all varieties tested except Statesman by dipping the fruit in aqueous alcoholic solutions of diphenylamine, 1,000 p.p.m., and also by spraying the fruit in the cases with the same concentration. With the latter treatment, however, some damage was sustained by the lowest layers owing to incomplete drainage. Paper wraps impregnated with DPA also controlled scald in Granny Smith, whereas oiled wraps were only partially effective with immature, early picked fruit. Other materials, including phenothiazine, did not give control and caused injury to some varieties. There was evidence that DPA may also reduce internal breakdown and core flush. [From author's summary.]—D.S.I.R., Havelock North.

1781. Harvey, H. E., and Clark, P. J.
Diphenylamine residues on apples. Effect of different diphenylamine treatments.

N.Z. J. Sci., 1959, **2**: 266-72, bibl. 3.

pples treated in different ways (wrapping, dipping r spraying) with this agent for the control of ald did not contain more than 8 p.p.m. of it. t least 90% of the diphenylamine was in the uter 4 mm. of the fruit. After storage for 3–7 onths, residues from any of the treatments rely exceeded 3 p.p.m.—D.S.I.R., Wellington.

782. N.S.W. Department of Agriculture, Biological Branch.
Bitter pit in apples.
Agric. Gaz. N.S.W., 1959, **70**: 308-10, illus.

leopatra, Willie Sharp and Sturmer are particular- susceptible. Recommended control measures e light pruning, provision of suitable soil moisture nditions, avoidance of manuring during the owing season, and, in susceptible varieties, delay picking.

783. Nyhlén, Å.
Kolsyreskador hos äpple—en gödslingsfråga? **(Brown heart of apples—a manurial problem?)** [English summary 1½ pp.]
J. roy. Swedish Acad. Agric., 1959, **98**: 253-63, bibl. 2.

he incidence of brown heart increased when the uit was kept at 18–20° C. after removal from ntrolled atmosphere storage; there was also an creased number of affected apples with later ckings. Analysis of apple juice showed an terrelationship between the K content and brown art, when K_2O levels in the juice were above 200–1,400 p.p.m. In further analyses it was own that with K_2O contents above 1,100– 200 p.p.m., and with a K_2O/P_2O_5 ratio greater an 30 brown heart is more likely to appear. il samples taken in late July showed a closer lationship to juice analyses than soil samples ken in September. The analysis of orchard soil oducing healthy fruits showed a high content of and a normal K_2O/P_2O_5 ratio, whereas orchards th a high proportion of affected fruit had high $_2O/P_2O_5$ ratios in the soil.—Stat. Trädgårdsförs., kerö.

84. Rootsi, N.
Analysmetodor för undersökning rörande kolsyreskador hos äpple. **(Methods of analysis for studying progressive brown heart of apples.)** [English summary ¼ p.]
J. roy. Swedish Acad. Agric., 1959, **98**: 264-6.

ocedures used for K and P.

85. Phillips, W. R., Rutherford, W. M., and Julien, J. B.
The development of scab in CA storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 3-4.

ab development on apples was as rapid in gas rage with 5% CO_2 plus 3% O_2 at 38° F. as in rmal storage at 32° F. The higher CO_2 level in gas storage reduced the development of scab to about the same extent as it was increased by the increase in temperature from 32° F. to 38° F.—Centr. exp. Fm, Ottawa.

1786. Phillips, W. R.
The use of low CO_2 levels in CA storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 2-3.

Low CO_2 mixtures allow the development of storage rots and are not recommended for McIntosh.

1787. Bömeke, H., and Blank, H.
Untersuchungen zur Bekämpfung der Lagerfäulen an Finkenwerder. **(Studies on the control of storage rots in the apple variety Finkenwerder.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 202-6.

Storage rots (chiefly gloeosporium) of the apple variety Finkenwerder were greatly reduced by spraying with Orthocide [captan] at 3–4-week intervals from the end of July onwards, the last application being in September, 3–4 weeks before the date of picking. It is believed that other late varieties would benefit similarly from the treatment. The economics of spraying to improve storage quality are discussed.

1788. Behr, L.
Stemphylium botryosum Wallr. als Erreger einer Lagerfäule am Apfel in Deutschland. **(*Stemphylium botryosum* as a storage rot pathogen of apples in Germany.)** [English summary 11 lines.]
Phytopath. Z., 1960, **37**: 245-51, bibl. 14, illus.

Hitherto unknown in Germany; susceptibility increased with ripeness.

1789. Stoll, K.
Über den Einfluss von Pflanzenschutzmassnahmen auf Lagerungsschäden an Äpfeln. **(The effect of plant protection chemicals on storage disorders of apples.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 4-7, bibl. 10.

A review, [see also *H.A.*, 28: 2229].

1790. Eaves, C. A.
Storage of Bartlett pears in controlled atmospheres.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 1-2.

Storage for 12 weeks in 9 different atmospheres has shown 0·8% CO_2 plus 2·5% O_2 and 2·5% CO_2 plus 2·5% O_2 to be the most promising. Storage scald was associated with high O_2 levels. CO_2 retarded yellowing and rot. Firmness was associated with high CO_2 levels, still higher levels causing internal breakdown.—Res. Stat., Kentville, N.S.

1791. CLAYPOOL, L. L., AND DAVIS, L. D.
Effect of cold and modified atmosphere storage on the canning quality of cling peaches.
Food Technol., 1959, **13**: 208-12, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-92.

The flavour of cling peaches deteriorates rapidly during storage prior to canning, but the deterioration is reduced by holding the fruit at 31–32° F. Seasons of higher than average temperature, or greater than average differences between daily maximum and minimum temperatures, may be associated with strong flavour; deterioration of flavour and loss of acidity are probably associated with the ageing processes of the fruit.

1792. MUKERJEE, P. K.
Storage of loquat (*Eriobotrya japonica* Lindl.).
Hort. Advance, 1958, **2**: 64-7, bibl. 3.

Tentative conclusions from storage trials are that fruits picked at the climacteric stage can be stored for 8 weeks at 35°–40° F., while fully ripe fruits can be kept at 35° F. for only 4 weeks without deterioration. Unsealed polythene bags were used as containers. It was found that the low temperature eliminated the characteristic browning of the fruit, and that the removal of hairs was not detrimental to the keeping quality after storage.—Hort. Res. Inst., Saharanpur.

1793. BERAHA, L., AND OTHERS.
Effect of gamma radiation on brown rot and rhizopus rot of peaches and the causal organisms.
Phytopathology, 1959, **49**: 354-6, bibl. 3.

Artificially inoculated peaches kept at 80–85° F. did not develop *Rhizopus nigricans* rot for at least 10 days after irradiation with 250,000 rep, nor brown rot (*Monilinia* [*Sclerotinia*] *fructicola*) for a similar period after 200,000 rep, although the controls were completely rotted in 5 days. Dosages of 400,000 rep and over damaged the fruit.—Agric. Mktg Serv., U.S.D.A.

Fruit drying.

1794. CHUMACHENKO, V. A.
Investigation of the dynamics of drying fruit in a high-frequency electric field. [Russian.]
Nauk. trudy Elektrif. selsk. Khoz., Vieskh, 1956, **2**: 167, bibl. 2, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**, Abstr. 1,475.

The theory of drying in a high-frequency electric field is explained. Experiments were conducted with apples to determine the dynamics of drying, power consumption, and the quality of the product in relation to the drying regime. The sliced fruit was placed on a 30 × 30 cm. screen and the automatic scales set; two 30 × 10 cm. electrodes were used with a wavelength of 40 m. The temperature of the drying air supplied at various speeds from a heat exchanger was measured at 5 points on the screen and the relationships determined between that temperature, air velocity, drying time, rate of evaporation, power consumption and initial moisture content. The effect of drying in a high-frequency field at fruit temperatures of 40° and 60° C. on vitamin content was compared with drying by hot gases at 60° C. and drying by the sun for 4 days.

1795. VARGUES, A. C.
Procurando novos rumos. (**Exploring new paths.**) [French and English summaries ½ p. each.]
Bol. Jta nac. Frutas Lisboa, 1957, **17**: 18-26, illus.

Experiments carried out in southern Portugal on the protection of figs against the moths *Ephestia calidella* and *E. cautella* led to the following recommendations. Harvesting should proceed at frequent intervals, and drying trays should be stacked out of doors and covered. The fruit should be fumigated with carbon disulphide before storage. For this purpose portable zinc-lined chambers of 1 cu. m. capacity have been used successfully. Storage baskets should be lined and capped with Sisalkraft.

SMALL FRUITS, VINES AND NUTS.

Strawberries.

(*See also* 1536, 1581, 1595, 1617, 1620, 1710, 1714, 1818, 1822, 2125, 2556, 3051, 3057, 3066.

1796. DODGE, J. C., AND SNYDER, J. C.
Growing strawberries in Washington.
Ext. Bull. St. Coll. Wash. **246**, revised 1959, pp. 18, illus.

Practical advice on growing the crop.

1797. SWANSON, J.
Estimated strawberry production costs, Whatcom County, 1958.
Stats Circ. Wash. St. agric. Exp. Stats **346**, 1959, pp. 6.

The average grower had a capital investment of $1,552 per acre in 16 acres, from which he expected to reap 108,000 lb. costing 9·5 cents per lb. to produce. Detailed tabulated data are provided.

1798. TURNER, D. H.
Early strawberries. An easy and profitable crop in Scotland.
Grower, 1960, **53**: 282-5.

Varieties and culture under cloches and dutch lights.

799. VIDAL MARTÍN, D.
Fresas y fresones. **(Everbearing and large-fruited strawberries.)**
Hojas divulg. Minist. Agric. Madrid **7-59 H**, 1959, pp. 28, illus.

arieties grown in Spain, cultural practices and lant protection.

800. DARROW, G. M.
Strawberry varieties—past, present, future.
Fruit Var. hort. Dig., 1959, **14**(1): 7-10, illus.

n the U.S.A.

801. (DENISEN, E. L.)
List outstanding berry varieties and selections.
Ia Fm Sci., 1959, **14**: 375-6, illus.

he best from a 3-year trial of 5 strawberry varieties as Armore, a late variety with large berries and ood yields.

802. ŁUCKA, M.
Badania nad wartością produkcyjną dziesięciu odmian truskawek. **(A study of 10 strawberry varieties.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk rol., Ser. A, 1959, **80**: 23-38, bibl. 24.

lorphology, phenology, cytology, pollination and uit composition were included in this study. The ighest yields were obtained from Oberschlesien, limax and Georg Soltwedel [for an earlier report e *H.A.*, 28: 1216r]. For processing Ville de aris, Afrique and Izabeline were the most suitable.

803. (DENISEN, I. L.)
Cyclone strawberry.
Amer. Nurserym., 1960, **111**(1): 119.

his new variety (Rockhill selfed × (Beaver × orsett)), raised at Iowa State College, is recomended for home gardens or local markets rather han for shipping. It has good colour, flavour and eezing quality, high fruit yields, moderate resisnce to leaf spot, is hardy in midwestern U.S. onditions but should be mulched for winter otection.

804. GARAGNANI, G.
Precisazioni sulla fragola Souvenir de Charles Machiroux. **(Details concerning the strawberry variety Souvenir de Charles Machiroux.)**
Frutticoltura, 1959, **21**: 629.

he disadvantages of this variety are very slow pening of the part of the fruit not exposed to the n, a tender skin, rather late ripening and fruit lour that becomes dark within a few hours of cking.

805. TELJATNIKOVA, G. N., AND AVERINA, L. I.
The production of strawberry planting stock on beds of peat compost. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(7): 22-8, illus.

comparison with allowing runners to grow in the fruiting plantations, planting them out in August and raising them for about 6 weeks in specially prepared beds produced a larger proportion of high quality plants. Wider spacing and the addition of peat to the runner beds both improved the quality of the planting stock. The extra cost of this method of plant production was offset by yield increases of 1·5–2·0 tons/ha. in the first year of fruiting.

1806. GUTTRIDGE, C. G.
Cold storage keeps runners for months.
Grower, 1960, **53**: 339-41, illus.

Talisman, Redgauntlet and Royal Sovereign runner plants have been successfully stored for several months at 28–30° F. The runners were lifted, shaken free of soil and after bundling were cold stored in 200-gauge polythene bags, a 2 × 2½ ft. size holding 300–400 plants. Plants must be lifted before spring growth starts. In the past lifting and storage from February has been practised, but autumn lifting and storage is under investigation. After planting, not later than early August, stored runners passed through a contracted growth cycle, first producing flowers, then runners and later new fruit buds inside the crowns, which emerged and cropped in the following year. —Scot. hort. Res. Inst., Mylnefield.

1807. (DENISEN, E. L.)
Dormant strawberries survive poorly when planted in the fall.
Ia Fm Sci., 1959, **14**: 300-1, illus.

Strawberry plants dug in the autumn and stored at a temperature below freezing point survived well when planted in the spring while they were still dormant, giving a 93% stand. Strawberries that had been in cold storage during the summer and then planted in a dormant state in the autumn flowered soon after planting and showed very poor survival. Freshly dug strawberries planted in the autumn survived much better.

1808. NOVIKOV, A. A.
The effects of a new method of strawberry culture. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1959, No. 7, pp. 30-4.

A simple and more economical rotation of crops, using an 8-year instead of a 10-year cycle, resulted in higher strawberry yields of up to 80–100 centners/ha., and also cleared the soil of weeds, pests and diseases. Clover or lucerne, grass for hay and a green manure crop preceded the planting of strawberries, which were then allowed to fruit for 3 or 4 years.

1809. GOLIKOVA, N. A.
Effect of foliar nutrition on physiological and biochemical processes in strawberries. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 3, pp. 57-68, bibl. 12.

Foliar nutrition increased yields of strawberries, and the absorption of 50% of P^{32} applied as Na_2HPO_4 was demonstrated. Applications of N, K, B and, to a lesser extent, P and of compound NPK solutions to the leaves increased soluble carbohydrate contents in the leaves and petioles. The rate of respiration increased in the first few hours after the application of P and K solutions. Foliar applications of N, P, K, B, Cu and NPK also increased the intensity of photosynthesis. Foliar nutrition with N, P and K increased uptake of P and K from the soil. Protein metabolism was little affected.

1810. Batalov, V. V.
Post-harvest feeding of strawberries. [Russian.]
Sad i Ogorod, 1959, No. 8, pp. 41-3, bibl. 5.

In general, post-harvest feeding with mineral fertilizers or dung increased the subsequent yields of strawberries. When 4 different mixtures of N, P and K fertilizers were tested, however, there were different responses in different years. Yields were much influenced by winter frost damage, but post-harvest feeding did not reduce hardiness.

1811. Foster, L. J., and Wood, R. A.
Further aspects of strawberry culture in Nyasaland.
Rhod. agric. J., 1959, **56**: 199-203, bibl. 10, illus.

Of 2 irrigation rates tested the higher, ⅔-acre-inch per application, produced significantly greater growth and yields. In areas with a prolonged dry season irrigation at the rate of 1 inch per week is recommended. Small responses to N and P were obtained, but only at the highest irrigation level. Variety C.449 was a heavier and earlier cropper than Melba. Close spacing and cropping for only one year are suggested.

1812. Močalov, V. V.
Irrigation regime for strawberries. [Russian.]
Agrobiologija, 1959, No. 6, pp. 941-2.

Experiments in which the soil moisture was allowed to fall from 60 to 35% of full moisture capacity in each of 5 growth stages showed that irrigation was most essential in the fruit swelling period. Lack of water in the flowering and post-harvest growth periods had less effect on yields.

1813. Müller, H., and Fuss, F.
Die Dauerbedeckung des Bodens im Erdbeeranbau unter besonderer Berücksichtigung der Bodenfeuchte und der Bodentemperatur. (**Mulching strawberry beds with special reference to the effect on soil moisture and temperature.**) [English and Russian summaries ½ p. each.]
Arch. Gartenb., 1959, **7**: 269-84, bibl. 7.

At Pillnitz in 1952 beds of 3 strawberry varieties were submitted from then onwards to 3 treatments, viz. clean cultivation, mulching with leaves, mainly beech, and mulching with a mixture of 50% reeds, 30% rape straw and 20% sawdust. Results were recorded in the years 1955–57. In 1955 soil moisture was found to be considerably higher in the mulched than in the unmulched beds, especially during dry periods, but there was no difference in this respect as between the two types of mulch. Similarly maximum temperatures were lower and minimum temperatures higher in the covered than in the uncovered soil. Despite these effects, there was no significant result of mulching on yield, and changes in fruit quality and time of harvest were only small. Possible reasons for these results are discussed, and the conclusion is reached that under the medium heavy soil conditions of Pillnitz mulching of strawberries is uneconomical.

1814. Gosselink, J. G.
The effect of photoperiod and light quality on the vegetative and reproductive growth of the strawberry.
Diss. Abstr., 1959, **20**: 1119, being *L.C. Card No. Mic.* 59-3577 of 83 pp.

The critical inductive photoperiod for Sparkle strawberries grown at a night temperature of 70° F. was found to be between 12 and 14 hours. The number of inductive cycles necessary for inflorescence initiation was variable; in one test 20 cycles were sufficient, while in later tests more than 20 were required to induce floral initiation in all plants. Initiation followed induction after about 10 days, and there was an indication that initiation was more rapid in long photoperiods than in short. After initiation the inflorescences emerged at the same rate as the leaves in a 16-hour photoperiod, but in 8- and 12-hour photoperiods inflorescences emerged more slowly than the leaves. Leaf area and petiole length increased with increasing length of the photoperiod. Successive leaves emerging under differential treatments responded increasingly to the treatment until a maximum response was obtained with the fifth or sixth leaf to emerge. The differences in petiole length were due almost entirely to differences in cell length, rather than cell number. Red irradiation during the last half-hour of a 12-hour photoperiod did not influence either the generative or vegetative responses of strawberry plants. Far-red irradiation after a 14-hour photoperiod increased petiole length in the first 6 leaves. The rate of leaf production was slightly decreased with red and far-red irradiation.—Rutgers Univ.

1815. Singh, J. P., and Randhawa, G. S.
Effect of gibberellic acid and *para*-chlorophenoxyacetic acid on growth and fruitfulness in strawberry.
Indian J. Hort., 1959, **16**: 14-17, bibl. 20, illus.

Plant height, peduncle length and flower bud formation of Pusa Dwarf Early were significantly increased by foliar sprays of GA or CPA at 5 or 10 p.p.m. The effect of GA was rather greater than that of CPA. Both compounds increased total yields, GA being more effective than CPA, and concentrations of 10 p.p.m. being more effective than those of 5 p.p.m. Fruit maturity was accelerated by 5 days after the application of 10 p.p.m. of CPA. At 10 p.p.m. GA extended the picking season by 8–10 days.—Indian agric. Res. Inst., New Delhi.

1816. Porlingis, I. C., and Boynton, D.
Growth responses of the strawberry plant to gibberellic acid and to environmental conditions.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): xvi-xvii.

Using potted Missionary and Sparkle plants under greenhouse conditions the following observations were made: (1) chilling at 35–40° F. for 1–2 months resulted in marked stimulation of vegetative growth, including increased leaf size, when plants were subsequently placed in the greenhouse. (2) Long days (16 hrs.) under greenhouse conditions caused both chilled and unchilled plants to produce more vegetative growth than short days (10 hrs.). (3) GA sprays (50 and 200 p.p.m.) stimulated vegetative growth of terminal axes and caused previously differentiated inflorescences to develop more rapidly, especially in Sparkle under short days with no or only a short chilling period; in long-day plants the sprays increased stolon production especially with chilled Missionary. (4) GA in lanolin paste (1%) applied to young expanding leaves induced stolon production from auxiliary buds of short-day plants. (5) Three GA sprays at 200 p.p.m. inhibited flowering and induced stolon production in long-day Sparkle plants; plants receiving 1 spray or none flowered and produced no stolons. (6) A natural growth substance was separated by paper chromatography from both varieties.—Cornell Univ., Ithaca.

1817. (Denisen, E. L.)
Stimulate runner growth of strawberry plants.
Ia Fm Sci., 1959, **14**(3): 14, illus.

In varieties which normally produce few or no runners, gibberellin sprays resulted in 30% of the plants producing runners. Other effects, including reduced fruit set, are also briefly reported.

Other small fruits.

See also 1517, 1534, 1536, 1578, 1604, 1614, 1617, 619, 1620, 1908, 2125, 3047, 3050, 3066.)

818. Burroughs, L. F.
The free amino-acids of certain British fruits.
J. Sci. Food Agric., 1960, **11**: 14-18, bibl. 24.

The total and alcohol-soluble nitrogen contents have been determined and the free amino-acids examined in strawberry, gooseberry (green and ripe), black currant, red currant, loganberry, raspberry, blackberry and tomato. Most of the common amino-acids were present, alanine and glutamine being the two most generally prominent. Free amino-acids have been examined in 20 non-edible species of apple and pear, in medlar (unripe and ripe) and in three species of *Vaccinium.* 1-Aminocyclopropane-1-carboxylic acid was not found in any fruit except ripe cowberries. [Author's abstract.]—Long Ashton Res. Stat., Bristol.

1819. Kovalev, N. V.
A large fruited variety of the oblong barberry. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 119-20, illus.

Berberis oblonga, growing at 1,400–2,500 m. in the Tjan-Shan' region, produces edible fruit. The fruit is usually 8 × 5 mm. in size, and 100 fruits weigh 13 g. A new variety observed at 1,900 m. has fruit 13 × 9 mm. in size, 100 of which weigh 26 g. It also has bigger leaves than the common variety.

1820. Markarian, D., and Olmo, H. P.
Cytogenetics of *Rubus*. I. Reproductive behavior of *R. procerus* Muell.
J. Hered., 1959, **50**: 131-6, bibl. 19, illus.

A high degree of sterility was found in the Himalaya blackberry under central California conditions, but it is considered that environmental factors may markedly influence self-fertility in this species.—St. Coll. Wash., Pullman, and Univ. Calif., Davis.

1821. Leipold, F.
Erfahrungen beim Anbau der Schwarzen Johannisbeeren. **(Experience in growing black currants.)**
ErwObstb., 1959, **1**: 178-81, illus.

Cultural trials with 6 black currant varieties in W. Germany.

1822. Dean, B. A.
Black currants do well in Lancashire.
Grower, 1960, **53**: 233.

Preliminary notes on trials at Fairfield Experimental Station, with special reference to black currant and strawberry varieties.

1823. Vitkovskij, V. L.
Influence of reduced and increased autumn and winter temperatures on the condition of black currant buds. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **126**: 890-3, bibl. 5, illus.

The condition of the foliar and floral primordia in the buds of black currant bushes, which had been moved into warm conditions at 15–20° C. on 4 different dates between 4 September and 24 November, was investigated at intervals throughout the winter. Degeneration of the floral primordia occurred earlier in those bushes moved into warm conditions before the outside temperature had fallen below zero than in those that had first been exposed to some frost. Secondary vegetative apices remained viable under warm conditions until April or May in plants moved on each of the 4 dates.

1824. TUMANOV, I. I., KRASAVCEV, O. A., AND HVALIN, N. N.
Resistance to −253° C. induced in birch and black currant by hardening. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **127**: 1301-3, bibl. 4, illus.

Cuttings, 35 cm. long, of 1-year-old black currant shoots of 2 varieties were cut when dormant and wrapped in cellophane. Over a period of 40 days the hardening temperature was lowered, 5° C. at a time, to −60° C. After this, plunging the shoots into liquid N_2 (−195° C.) for three days and then into liquid H_2 (−253° C.) for 2 hours did not kill the shoots, which after the experiment produced roots and flowers containing viable pollen. Unhardened shoots were killed at −40° C. Microscopical observations showed that during gradual hardening ice crystals were formed in the intercellular spaces, and that at −60° C. only hygroscopic water, which could not be frozen, remained in the cells. After this, further rapid cooling was not harmful.

1825. INDENKO, I. F.
Increasing the effectiveness of basic fertilizer dressings on black currants. [Russian.]
Bjull. nauč.-tehn. Inf., Mičurinsk, 1958, No. 6, pp. 60-3.

The P^{32} content of leaves and the fruit yields were compared following the application of superphosphate or of NPK fertilizers plus compost, (1) dug in 8–12 cm. deep under the bushes, (2) in furrows 15–18 cm. deep, and (3) in furrows 27–30 cm. deep. The highest leaf P^{32} contents on 6 May, 9 days after completion of the application, were found in bushes treated by method (2). By 31 May and for the rest of the summer, the highest P^{32} contents were found in bushes with the deepest fertilizer placement (method 3). The deepest placement also gave the highest fruit yields in the 2 years following application. [See also *H.A.*, 30: 321.]

1826. ROACH, F. A., AND PERRIN, M. E. B.
Highbush blueberries.
Agriculture, Lond., 1959, **66**: 336-9, illus.

A trial planting on acid, peaty sand in the south of England is described. Twenty-one, mostly American, varieties were tested. Of the older varieties, Burlington, Jersey, Pemberton and Stanley were promising, and amongst the best of the newer kinds were Earliblue and Berkeley. The best yields were equal to about 4 tons/acre in the 6th year. Planting material was produced from both hard- and soft-wood cuttings. The former did best with bottom heat and required much attention. Soft-wood cuttings rooted well under mist. Cultivation and pruning practices are described. Birds were a nuisance.—N.A.A.S.

1827. HARD, M. M., AND ROSS, E.
Freezing blueberries.
Bull. Wash. St. agric. Exp. Stats **600**, 1959, pp. 9, bibl. 5.

Of 5 varieties evaluated for freezing quality Concord was the best.

1828. HEDDEN, S. L., GASTON, H. P., AND LEVIN, J. H.
Harvesting blueberries mechanically. A progress report.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 24-34, illus.
Mechanizing the blueberry harvest.
Agric. Res. Wash., 1959, **8**(4): 7, illus.

Equipment for picking, collecting and cleaning blueberries, some of which became commercially available in the current year, is described in the first article. In the latest trials the cost of these processes was reduced from 8 cents per lb. for manual operation to 3½ cents for complete mechanization. In the second article brief notes are given on an electric vibrator, a 2-bush fruit collector and a pneumatic sorter.

1829. AVENT, K. L.
Berry fruit growing in Victoria. 4. Chinese gooseberries.
J. Agric. Vict., 1959, **57**: 647-51, 677, illus.

Details are given of recommended methods for cultivating *Actinidia chinensis*, including the construction of a trellis or pergola to carry the vines. No pests or diseases have yet been observed in Victoria.

1830. SWENSON, A. A. (FILMER, R. S.).
Bees and cranberries.
Amer. Fruit Gr, 1960, **80**(1): 34, illus.

During recent years cranberry yields have been very low in New Jersey, following controlled burning and destruction of brush, with the consequent destruction of wild honey bees. When bees were placed in experimental plots at the rate of 1 colony per acre, yields were increased by 50%, and 2 colonies per acre gave a further 60% increase. [See also *H.A.*, 28: 2301j.]

1831. FILMER, R. S., AND DOEHLERT, C. A.
Use of honeybees in cranberry bogs.
Circ. N.J. agric. Exp. Stat. **588**, [1959], pp. 4.

A series of questions and answers, including the need for supplementing wild bees.

1832. KAUFMAN, J , AND OTHERS.
Effect of precooling on market quality of cranberries shipped by rail or truck.
Mktg Res. Rep. U.S. Dep. Agric. **287**, 1958, pp. 9.

In precooling, temperatures of 45° and 40° F. were reached in 24 and 48 hours respectively. During shipment precooled loads averaged 6 to 12 degrees cooler than non-precooled loads, and developed less decay. However, when cranberries were stored for 3–4 weeks in common storage during cool weather, decay was about the same in precooled and non-precooled berries.

1833. ANON.
Keeping cranberries cool.
Agric. Mktg, 1959, **4**(7): 16.

Cranberries stored for 12 weeks at 40° F. showed no more spoilage than those kept in common storage for a fortnight. Graded and packed samples did not require re-grading after 6 weeks in cold store.

1834. STROH, H.-H.
Die Verteilung der γ-Pyronfarbstoffe und Hydroxyzimtsäuren des Holunders während der Vegetation. **(The distribution of γ-pyron pigments and hydroxycinnamic acids in elders during the growing period.)**
Naturwissenschaften, 1958, **45**: 547-8, bibl. 8.

At various stages of fruit development.

1835. PISANI, P. L.
La coltura del lampone in una azienda agricola della provincia di Firenze. **(Growing raspberries on a farm in the province of Florence.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 449-58, bibl. 9, illus.

Cultural practices, disease and pest control, harvesting and economics of a crop not commonly grown in Italy.

1836. WOOD, C. A.
Raspberry research.
Agriculture, Lond., 1959, **66**: 279-83, bibl. 6, illus.

Recent work at Mylnefield and East Malling is discussed, including breeding for the development of resistance to virus and fungal diseases. Stress is laid on the commercial availability of completely virus-free stock since 1958. Optimum planting distances have been found to be 5½–6 ft. between rows and 2 ft. between stools; the number of canes per stool could be raised to 7 or 8 with advantage. Recent experiments suggest that "stooling" is preferable to "suckering" for the production of replacement canes. Tipping height should not be below 5 ft., and tipping could be replaced by bending the tips over and tying them to the top wire.

1837. HEGGLI, M.
Identifisering og beskrivelse av bringebaersorter. **(The identification and description of raspberry varieties.)**
Frukt og Baer, 1959, **12**: 52-66, bibl. 8, illus.

A key, with illustrated descriptions of 18 varieties.

1838. KONDRAT'EVA-MEL'VIL', E. A.
Formation of buds on the roots of *Rubus idaeus* L. [Russian.]
Bot. Žurnal, 1959, **44**: 651-7, bibl. 22, illus.

Buds are initiated in great numbers in the phellogen of raspberry roots in September and October, at the time the 2-year-old shoots die off. Large buds arise mostly on 2–3-year-old roots, but many small buds are present, though hardly visible, on younger roots. The origin and the further development or dying of these buds is discussed in relation to the phases of development of the aerial organs.

1839. SCHWARTZE, C. D.
A chemical hoe for red raspberries.
Stats Circ. Wash. St. agric. Exp. Stats **354**, 1958, pp. 4, bibl. 2, illus.

A tractor-mounted, hooded spray boom is described. The recommended spray consists of 1 quart DNBP plus 10 gal. diesel oil emulsified in water to make 100 gal. This is effective for the control of annual weeds and raspberry suckers. To control the latter effectively spraying should start when they are less than 3 in. in height and they should not exceed 12 in. Suckers should be treated every 10 days for the first 3 or 4 sprayings, and then at 2–3-week intervals until just prior to harvest.

1840. GULJAMOV, H.
The effect of fertilizers and the number of irrigations on the growth and yield of raspberry. [Russian.]
Soc. s.H. Uzbekistana, 1957, No. 3, pp. 56-7, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,363.

In irrigation experiments with 2 raspberry varieties in Uzbekistan the soil moisture content was not allowed to drop below 18%. Water was applied at 800 cu.m./ha. 8, 12 or 16 times per season. The optimum number of applications for securing high yields was 12. In fertilizer experiments with 2 varieties 60 kg. N, 45 kg. P and 20 tons of compost per ha. gave the largest yields.

1841. ANON.
De teelt van rode bessen langs draad. **(Growing red currants on wires.)**
Fruitteelt, 1959, **49**: 940-1, illus.

Advantages discussed [see also *H.A.*, 29: 1185 and 3319].

Vines—breeding and varieties

(*See also* 1620, 2800.)

1842. SOLOVEJ, G. T.
Methods of overcoming the dominance of wild forms during interspecific crossing of vines. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(9): 18-23, illus.

Seven varieties of *Vitis vinifera* were crossed with *V. rotundifolia*, *V. riparia* and *V. rupestris* in an attempt to produce high quality grapes on plants resistant to phylloxera. The methods adopted included cross-pollination with mixed pollen of several vinifera varieties plus that of one or two wild species, repeated crossing, artificial infection and the provision of optimum growing conditions. Some of the hybrids produced are described, together with details of the morphological and anatomical characteristics of resistant roots.

1843. Enin, T. K.
Production of polyploid shoots on vines. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 66-9, illus.
A 0·05% solution of heteroauxin applied three times to the 3 subterminal buds of 45–50-day-old green shoots of grape vines, after pinching out the terminal bud, induced the formation of polyploid shoots which bore fruit the following year. The shoots were more vigorous, had larger leaves and produced larger fruit than normal diploid shoots.

1844. He̊-Pu-Čao.
The cultivation of grapes in China. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(6): 46-8.
The 8 main varieties in cultivation are described, together with details of climatic conditions and cultural methods.

1845. Dalmasso, G., Dell'Olio, G., and Ricci, P.
Cortese. Brachetto. **(The wine grape varieties Cortese and Brachetto.)**
Ann. Sper. agrar., 1959, **13**(4), Suppl. pp. clxiii-clxxii, bibl. 11, and clxxiii-clxxxiv, bibl. 12, both illus.
Detailed descriptions.

1846. Cosmo, I., and Forti, R.
Rondinella. Rossignola. Nosiola. **(The wine grape varieties Rondinella, Rossignola and Nosiola.)**
Ann. Sper. agrar., 1959, **13**(4), Suppl. pp. cxxxiii-cxlii, bibl. 3; cxliii-clii, bibl. 13; cliii-clxii, bibl. 13; all illus.
Detailed descriptions.

1847. Maingonnat, A.
Les raisins de table en Tunisie. **(Table grapes in Tunisia.)**
Tunis. agric., 1959, **60**: 63-80, illus.
Varietal descriptions with illustrations.

Vines—propagation and rootstocks

(*See also* 1859, 1909, 3050.)

1848. Dolgova, A. E.
The effects of storage conditions of grape seeds on germination and growth of the seedlings. [Russian.]
Sad i Ogorod, 1959, No. 9, pp. 65-8, bibl. 8.
Poor germination was obtained after storing seeds dry, in paper bags, in the laboratory for 6 or 8 months. Storing seeds for as long as possible in the berry or stratification in damp sand at 1–3° C. for 180–210 days both markedly improved germination. Seedlings from seeds stratified over a long period grew vigorously and showed improved winter hardiness.

1849. Cosmo, I.
Nuova macchina per innesti al tavolo. **(A new machine for bench grafting.)**
Riv. Vitic. Enol., 1959, **12**: 377-80, illus.
The machine is operated by a small motor dynamically balanced by special electronic apparatus. It exerts only light or moderate pressure, and instead of cutting for the traditional whip and tongue graft of vine cuttings it prepares a number of complementary ridges on stock and scion for complex wedge grafting. With a team of 6–7 workers, of whom 2 actually operate the machine, 12,000 grafts can be made in a day, compared with 7,000–8,400 by hand. In preliminary tests neat and solid unions have been obtained.

1850. Filimonov, S. I.
Mechanised grafting of vines. [Russian.]
Sad i Ogorod, 1959, No. 12, pp. 54-7, illus.
A description of workshop layout and machinery.

1851. Zankov, Z.
Establishing vineyards on sandy soils. [Bulgarian.]
Lozarstvo i Vinarstvo, 1957, **6**(1): 4-7, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 73,166.
Vines were grown on their own roots in several regions of Bulgaria on soils which, to a depth of 140 cm., contained 69–81% sand. Phylloxera did not develop under these conditions. On one plot autumn-planted unrooted cuttings of 23 varieties started growth 10–15 days earlier and developed better during the first 2–3 years than cuttings planted in the spring.

1852. Văleanu, L., Baltagi, N., and Popa, S.
Distanţele de plantare a viţelor portaltoi. **(Planting distances for grape vine stocks.)** [English, French, Russian and German summaries ⅔ p. each.]
Grăd. Via Liv., 1959, **8**(5): 25-6 + summaries.
For unworked rootstocks the recommended planting density is 3,500–5,000 per hectare. Closer planting produced better quality grafting material but made mechanical cultivation more difficult.

1853. Mamarov, P. T.
Physiological changes induced by the rootstock in vine scions. [Russian.]
Agrobiologija, 1959, No. 4, pp. 527-32, bibl. 15.
In the spring plants of Gymza and Mavrud vines grafted on Montikola and Kober 5BB rootstocks

had higher total, amino- and protein-nitrogen percentages in the sap, and throughout the growing season higher peroxidase and polyphenoloxidase activities and a higher pigment content in the leaves, than plants of the same varieties growing on their own roots. It is concluded that in the root system of vines important biochemical processes occur, which are closely related to the oxidation processes and to the accumulation of pigments in the aerial organs.

1854. DE MOS, D.

Telen we Black Alicante op onderstam? **(Should Black Alicante be grown on a rootstock?)**

Fruitteelt, 1959, **49**: 1085-6, illus.

In tests in a cold house a comparison was made between Black Alicante grown on 5 rootstocks and on its own roots. The most vigorous growth was produced on West-Frisia, which also gave good fruit colour but the latest ripening. The best fruit colour was produced by Black Alicante on its own roots, which also made satisfactory growth and was among the earliest to ripen. Fosters White Seedling gave satisfactory growth, good colour and early ripening. Gros Maroc and Gros Colman gave weak growth and poor fruit colour. Frankenthaler had a tendency to induce shanking. It is concluded that on good soils, that do not become waterlogged in winter, Alicante should be grown on its own roots.

Vines—growth, reproduction and physiology.

(*See also* 1710, 1737, 1853, 1874, 1875, 1909, 2020, 2046.)

1855. METAXA, G., AND OTHERS.

Creşterea sistemului radicular al viţei de vie în condiţii diferite de climă şi sol. **(The development of grapevine root systems under varying climatic and soil conditions.)** [English, French, Russian and German summaries ⅔ p. each.]

Grăd. Via Liv., 1959, **8**(8): 24-8 + summaries, illus.

Distribution of the root system was shown to be affected by depth and type of soil, planting distance and application of fertilizers. The maximum amount of roots was found at depths of 20–40 cm. in all soil types.

1856. RYBAKOV, A. A., AND DŽAVAKJANC, JU. M.

Regeneration of vine roots. [Russian.]

Sad i Ogorod, 1959, No. 10, pp. 69-72, illus.

Roots of 20-year-old grape vines were examined in October after being cut back to within 50 cm. or 125 cm. of the stem on 6 different dates during the year. Roots pruned in the previous autumn regenerated more strongly than those pruned in March or during the summer. Pruning in September or November induced growth to start 1 month earlier in the spring than did March pruning. Thick roots regenerated more strongly than thin ones pruned at the same time, and it is suggested that this explains the greater regeneration that was found when roots were pruned close (50 cm.) to the stem.

1857. NASTEV, D.

Further studies on the fertilization of some native and foreign vine varieties in Macedonia. [Yugoslav, with French summary 2 pp.]

Annuaire Fac. Agric. Sylvic. Skopje, 1957/58, 1958, **11**: 111-42, bibl. 23, illus.

A continuation of earlier work [*H.A.*, 26: 1488] on germination capacity of the pollen, structure of the flowers and self- or cross-fertility of many vine varieties.

1858. STOEV, K. D., MAMAROV, P. T., AND BENČEV, I. B.

Chromatographic analysis of sugars and free amino acids in the ascending and descending sap of vines. [Bulgarian, with Russian and German summaries 2 pp. each.]

Nauč. Tr. visš. selskostop. Inst. G. Dimitrov, Sofia, 1959, **7**: 371-406, bibl. 62, illus.

Chromatographic analysis of sugars and free amino acids in the sap of vines. [Russian, with English summary ½ p.]

Fiziol. Rast., 1959, **6**: 408-14, bibl. 28, illus.

Analyses of the sap from 1-year-old shoots and from the roots of a vine plant showed considerable changes in the sap composition during the growing period. The period of the most intensive sap flow was characterized by the presence of fructose, glucose and sucrose, which decreased markedly during the flowering period and later disappeared completely. A greater quantity of sucrose was detected in the root sap than in the shoot sap. It is suggested that sucrose is the principal form in which carbohydrates are transported from the roots to the upper parts of the plant. During the initial stages of the sap flow only 4 amino acids were detected; the number increased to 12 during the middle of May and then decreased during flowering. The quantity of sugars and amino acids in the sap was greatest from 8 a.m. to 2 p.m. Applications of N, P and K considerably increased the content of sugars and doubled that of amino acids, but only temporarily [see *H.A.*, 30: 356]. Maltose is considered to play an important physiological role during the dormant period. Glucuronic acid was observed during the dormant period and at the beginning of vegetation. The greatest number of amino acids was found in the petioles, bark, xylem, grape stalks and roots. Histidine, aspartic and glutamic acids, isoleucine, norvaline, alanine and tyrosine, found in all parts of the plant, and at all periods of growth, are believed to play a basic role in the downward transport of organic N.

1859. Pieri, G.
Effetti dell'acido gibberellico sulla vite. **(The effects of gibberellic acid on vines.)**
Riv. Vitic. Enol., 1959, **12**: 409-18, bibl. 13, illus.

The treatment of vine seeds by 10 days' immersion in 10, 25, 50 or 100 p.p.m. of GA delayed germination and slightly reduced the percentage of seeds germinating. Vine seedlings treated with 10 p.p.m. GA grew faster than the untreated controls for about a month, but before the end of the growing season they were overtaken by the controls, which were richer in chlorophyll. Spraying vines with 100 p.p.m. GA soon after flowering resulted in the production of loose bunches with numerous small and few full-sized grapes, poorly coloured fruit and irregular ripening. The effects were less marked at lower concentrations and negligible at 10 p.p.m.

1860. Mittempergher, L.
Indagini sulle possibilità di impiego pratico delle gibberelline in viticoltura. (**Investigations of the possibilities of practical application of gibberellins in viticulture.**) [English summary ¼ p.]
Ann. Sper. agrar., 1959, **13**: 601-33, bibl. 8, illus.

GA applied at 5, 50 or 200 p.p.m. to the vine varieties Trebbiano and Albana had no effect on the time of bud burst. Treatment of the whole crown increased the rate of growth of the internodes, but in most cases a subsequent decrease gave final shoot lengths equal to those of untreated control vines. This general treatment, as well as localized applications to inflorescences of the varieties Trebbiano and Malvasia, produced lax, elongated fruit bunches (with thick, woody main stalks and withered terminal berries in Malvasia under high dosage). Fruit size was increased by high concentrations applied before fruit set in Trebbiano and Malvasia, but Albana reacted to 200 p.p.m. applied immediately after bud burst by producing smaller grapes. In all 3 varieties the high doses had pronounced fruit thinning effects. The sugar content was increased and the acidity decreased in Albana by very early treatment and also by low concentrations applied at or immediately before flowering, but the other treatments gave the opposite result.—Ist. Colt. arbor. Univ. Pisa.

1861. Krishnamurthi, S., Randhawa, G. S., and Singh, J. P.
Effect of gibberellic acid on fruit set, size and quality in the Pusa Seedless variety of grapes (*Vitis vinifera* L.).
Indian J. Hort., 1959, **16**: 1-4, bibl. 8, illus.

GA at 10 and 25 p.p.m. sprayed on flower clusters increased fruit set by 76·5% and 59·11% respectively. At 50 p.p.m. GA reduced fruit set by 15·4%, but produced the highest average bunch and berry weights. In general, GA treatment resulted in a more elongated berry, but had no effect on fruit quality.—Indian agric. Res. Inst., New Delhi.

1862. Maxwell, N. P.
Effect of gibberellin on size of Thompson Seedless and Perlette grapes in South Texas.
J. Rio Grande Valley hort. Soc., 1959, **13**: 117-18, bibl. 3.

GA at 15, 20 and 50 p.p.m., applied to vines when the berries were at about the small pea size, increased the average size of berries in 3-year-old Thompson Seedless grapes as much as girdling, and, in the case of the 20 p.p.m. rate, raised the total solids percentage to a comparable figure; other concentrations of GA slightly decreased the percentage of total solids. No effect was observed on 2-year-old Perlette vines.—Texas agric. Exp. Stat., Weslaco.

1863. Lavee, S.
Effect of gibberellic acid on seeded grapes.
Nature, 1960, **185**: 395, bibl. 7.

Bunches of Queen of Vineyard grapes were sprayed 23 days after full bloom with 20 p.p.m. of NAA and GA separately. NAA had no effect on fruit size, but GA increased the weight by 2·5 times in seedless grapes, less markedly so in fruit with 1 or 2 seeds per berry and not at all in fruit containing 3 seeds.—Agric. Res. Stat., Rehovot, Israel.

1864. Rives, M., and Pouget, R.
Action de la gibberelline sur la compacité des grappes de deux variétés de vigne. **(Effect of gibberellin on the compactness of the bunches of two vine varieties.)**
C.R. Acad. Agric. Fr., 1959, **45**: 343-5, bibl. 2.

In a trial in 1958 GA was applied to the varieties Chasselas and Folle Blanche in early May when the shoots were 15–20 cm. long, at concentrations of 10, 50 and 100 mg. per l. and at the rate of 30 ml. per vine. The two higher concentrations were injurious to Chasselas, but with the 10-mg. concentration bunch length was increased to 10–15 cm. compared with 7 cm. in the control, bunches were much more open and consequently had a considerably higher commercial value, and the grapes had a mean diameter of 14·7 mm. compared with 12·5 mm. in the control. The effects of GA on Folle Blanche were slight.—Stat. Rech. vitic. Sud-Ouest.

1865. Kessler, B., and Lavee, S.
Effect of purines, pyrimidines and metals upon the flowering of olive trees and grape vines.
Ktavim, 1959, **9**: 261-3, bibl. 5.

Of a number of chemicals tested sprays of uracil at 50 p.p.m. applied to Dabouki vines in May caused significant increases in the number of bunches of grapes per branch. Sprays of uracil and xanthine applied at the same strength to olives in September, increased the number of flowers per branch the following year. The addition of $\frac{1}{2}$% $FeSO_4$ enhanced the effect of xanthine. No effect was observed on pear and cherry trees.—Agric. Res. Stat., Rehovot.

Vines—spacing, training and pruning.

(*See also* 1616.)

1866. Malan, A. H.

Wider espacement of table grapes advisable.
Fmg S. Afr., 1959, **35**(9): 19-20, illus.

In a pilot trial over 3 years Alphonse Lavallée at 10 × 10 ft. spacing produced 60% more export quality grapes than at 14 × 14 ft. or 8 × 6 ft., whether irrigated or not. Waltham Cross under irrigation and at 14 × 14 ft. spacing yielded 30% more than at 10 × 10 ft. and about 150% more than at 8 × 6 ft.; with no irrigation yields were 50% higher at 10 × 10 ft. and 8 × 6 ft. than at 14 × 14 ft. Square planting is advantageous to root spread and increases the ratio of trellis to surface area of soil. Wider spacing, although requiring fewer trellis stays, needs more inside standards. Greater mechanization, including deeper working of fertilizers, is possible with wider rows.

1867. Serpuhovitina, S. F.

The spacing of grape vines. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(6): 32-7.

Average weight of bunches, yield per plant and yield per hectare are quoted from experiments with 2 varieties planted at distances ranging from 0·5 to 1·5 m. apart in rows 2·25 m. apart. A vigorous dessert variety produced its highest yield per hectare (10,000 kg./ha.) when planted 1·25 m. apart in the row, whereas a less vigorous wine variety was best spaced at 0·75 m. in the row. Optimum spacing varied with vigour of growth, fertility of the soil, and climatic and cultural conditions.

1868. Lazić, S. P.

Uticaj rastojanja i rasporeda čokota na prinos nekih sorti vinove loze u Fruškoj Gori. (**The effect of the spacing and arrangement of plants on the yield of some vine varieties in Fruška Gora.**) [French summary 1 p.]
Arh. poljopr. Nauk., 1959, **12**(36): 11-30, bibl. 10.

Five vine varieties on Berlandieri × Riparia Teleki 8 B were planted in 1949 at combinations of 5 distances within the row and 3 distances between the rows, giving densities ranging from 3,472 to 13,888 plants per ha. Figures for yields and vegetative growth are given for 1952–1956. The yield of fresh grapes and weight of shoots per plant, and weight of individual bunches, were greatest at the lowest density, but yields per hectare were greatest at the highest density, from which also the best quality must was obtained. Under the system of pruning used not all the buds broke, because of excessive numbers or frost injury, but the ratio of shoots obtained to buds left after pruning was greatest with the highest plant density. Where the plants were widely spaced, the ratio between yield and vegetative growth was greatest, thus making the most economic use of the nutrients and metabolites available. Although the area occupied by the plants could not be precisely determined, it was evident that for a given population density the yield declined the more the shape of the area departed from the square.

1869. Winkler, A. J.

Pruning grapevines.
Circ. Calif. agric. Exp. Stat. **477**, 1959, pp. 11, illus.

Pruning principles, the relationship between pruning and plant behaviour, and methods of pruning young and bearing vines are discussed.

1870. Peyer, E.

Erziehungsart und Grösse der Trauben. (**Mode of training in relation to size of grapes.**)
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 27-31.

Tabulated data illustrate the relationship between spacing and method of training on the one hand and the number of grapes, their size and weight on the other. The number of buds to which the vines should be pruned with different methods of training and spacing is also indicated, the object being optimum yields compatible with high quality. The figures have been worked out for the varieties Blauburgunder and Riesling × Sylvaner under the conditions of Wädenswil.

1871. Tavadze, P. G.

The effect of cultural measures on the resistance of vines to low winter temperatures. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(8): 16-19, bibl. 6.

The level of reserve nutrients and the capacity of vines to withstand unfavourable conditions are considerably affected by the method of training, the severity of pruning and the density of planting, and also by the nutrient status and water regime of the soil. The storage organs of vines trained as espaliers had a higher nutrient content than did those of cordons carrying a large number of buds. Nutrient accumulation showed a negative non-linear relationship to plant density. High soil fertility and soil moisture in the region of 40–60% of field capacity favoured the development of frost resistance.

1872. Gallay, R., Leyvraz, H., and Simon, J.-L.

Le problème des cultures hautes en viticulture. (**The problem of high training systems in viticulture.**)

Rev. romande Agric. Vitic., 1960, **16**(1): 1-3.

The Lenz Moser training system, with its tall vines and wide spacing, has given less satisfactory yields and fruit quality than either the vase or Guyot systems for the variety Chasselas, or the Guyot system for Black Pinot.

1873. May, P.

Effect of direction of growth on sultana canes.

Nature, 1960, **185**: 394-5, bibl. 4.

Vines grown on a tall trellis were trained to 0°, 45°, 90° and 120° from the vertical. Diversion from the vertical severely depressed fruitfulness and bunch primordium development, and increased internode length, although the latter effect was possibly partly due to shading.—C.S.I.R.O., Merbein, Victoria.

1874. Miotto, G.

Considerazioni sulla fertilità delle gemme del Merlot, in dipendenza dell'elevato numero di gemme cieche che esso presenta. (**Observations on the fertility of buds of Merlot vines in relation to the high proportion of blind buds produced by this variety.**)

Riv. Vitic. Enol., 1959, **12**: 367-76, illus.

The number of unproductive or dormant buds between the 2 basal and the 2 apical buds was reduced by allowing the shoots to bend down naturally, instead of bending and fixing them by hand as in the Sylvox training method. The new method gave much greater uniformity in fruit bunch size and higher production per vine.

1875. Malan, A. H.

Which buds on bearers give best yields?

Fmg S. Afr., 1960, **35**(10): 15, 30.

A comparison, extending over 3 years, of the bearing qualities of various buds on New Cross vines has shown that buds at nodes 4–6 from the base of the bearer together produced 125% more bunches than buds at nodes 1–3, and that nodes 7–9 and 10–12 produced 193·7 and 172% more bunches respectively. The average bunch weight increased progressively from buds 1–3 upwards. Shoots were found to reach a higher degree of fertility from about node 5, the highest being at node 8. In each group of 3 buds that nearest to the tip bore the best grapes. More than 1 bunch was produced by 32·4% of the bearing shoots, but 3 bunches were rare. The rearmost bunches (nearest the bearer) were on average 21% heavier than the foremost, and also produced 61·7% more select grapes. Pruning should therefore aim at leaving bearers with 6–8 buds, and to obtain larger crops an increase in the number of bearers rather than an increase in the number of buds is advised.

1876. Kikačejšvili, R. M.

Obtaining supplementary yields of grapes on laterals. [Russian.]

Vinodelie i Vinogradarstvo, 1959, **19**(8): 25-8, bibl. 1.

In Georgia the retention of one lateral per main shoot increased the yields of early and mid-season vine varieties, especially in years when yields tended to be low.

1877. Rjabčun, O. P.

The date of pruning and covering grape vines. [Russian.]

Vinodelie i Vinogradarstvo, 1959, **19**(7): 23-6.

Experiments, in which vines were pruned and covered for the winter on 5 different dates from 2 September to 18 November, gave different results with the 2 varieties tested. Early pruning and covering afforded better protection from frost damage to buds and, in the variety Šasla, gave the highest yields in the following year. In the variety Senso, however, in which inflorescence differentiation occurred later, the best crops were produced when pruning and covering was done on 30 September.

1878. Anon.

Try pinching shoots to raise grape yields.

Ia Fm Sci., 1959, **14**(2): 21.

Pinching out the growing points of vine shoots 4 days before bloom increased Concord grape yields more than pinching 6 days or 1 day before bloom. Yield increases were found to result from increased set rather than from increases in the size of clusters or of individual berries.

Vines—nutrition and irrigation.

(*See also* 1686.)

1879. Bovay, E.

Étude de l'alimentation de 157 parcelles de vigne de Suisse romande par la méthode du diagnostic foliare. (**A study of the nutrient status of 157 vineyards in French Switzerland by means of foliar diagnosis.**) [English, German and Italian summaries ⅓ p. each.]

Landw. Jb. Schweiz, 1959, **8**: 605-20, bibl. 5.

Methods of leaf and soil sampling and tables of results.

1880. Bucur, N., Teșu, C., and Dumbravă, I.

Semnalarea nevoii minime de îngrășăminte a solurilor din viile pe rod. (**A method for determining the minimum fertilizer requirements of soils in fruitful vineyards.**) [English, French, Russian and German summaries ⅔ p. each.]

Grăd. Via Liv., 1959, **8**(6): 35-8 + summaries.

The soil layers containing the largest quantity of vine roots, and therefore most seriously depleted of minerals, were discovered by determining the conductivity of the soil solution. Chemical analysis of soil samples from these layers indicated fertilizer requirements.

1881. Minasjan, A. I., Nalbandjan, A. D., and Makrosjan, G. E.
The effect of fertilizers on the microbiological activity of vineyard soils. [Russian.]
Bjull. nauč.-tehn. Inf. Arm. n.-i. In-ta Vinogradarst., Vinodel. i Plodovodst., 1957, No. 1, pp. 17-20, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,375.

In the Aral lowlands azotobacter is generally distributed in vineyard soils and atmospheric N fixation is intensive. The combined application of PK and organo-mineral fertilizers increased the population of nitrifying bacteria and the process of ammonification, resulting in yields being raised by 41%.

1882. Arutjunjan, A. S.
The availability of P_2O_5 from superphosphate applied in combination with dung. [Russian.]
Agrobiologija, 1959, No. 6, pp. 936-8.

Experiments showed that more P_2O_5 became available to grape vines when superphosphate was applied together with dung than when it was applied alone. The increase in total yield and P content of the grapes was greater with the combined application than was the sum of the increases resulting from the application of superphosphate and dung separately.

1883. Verona, O.
Boro e vite. **(Boron and vines.)**
Inf. fitopat., 1959, **9**: 296-9, illus.

Symptoms of B deficiency are described for shoots, tendrils, leaves, inflorescences and roots of vines, and numerical data are tabulated for B uptake, and for the B content of leaves, fruit buds, floral organs and pollen under conditions of low, medium and high B supply. Recommendations for B application are made, partly on the basis of results obtained by German workers, the deficiency threshold being 12–15 p.p.m., and the normal value 20–25 p.p.m., of leaf dry matter.

1884. Delas, J., and others.
Toxicité du cuivre dans les sols viticoles du sud-ouest atlantique. **(Copper toxicity in vineyard soils of the south-west Atlantic coastal region.)**
C.R. Acad. Agric. Fr., 1959, **45**: 651-5, bibl. 11.

The accumulation of Cu in vineyard soils, due to prolonged use of copper fungicides, and the enhancement of Cu toxicity by soil residues of sulphur fungicides have damaged young vines and other crops, particularly leguminous vegetables, planted in old vineyards. In attempting to correct the condition by liming, care must be taken on sandy soils to apply the lime in repeated small quantities to avoid destroying the humus. Green manure crops should follow. The feasibility of deep ploughing to "dilute" the Cu accumulation depends on the nature of the subsoil.

1885. Šišniašvili, M. E.
New kinds of organo-mineral microfertilizers to control chlorosis of vine shoots. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(4): 28-31, bibl. 8.

The relationship between the total Ca and soluble Ca in a given soil varied markedly with depth. Consequently it was not possible to forecast the degree of chlorosis in vines from soil analyses. Two new organo-mineral compounds containing iron and manganese, OP-U-Fe-57 and OP-M-Fe-57, were tested and found to be effective for curing chlorosis. Potentiometric titration showed them to be more stable in alkaline solution than inorganic salts. In field tests increased growth and chlorophyll contents of chlorotic shoots followed treatment.

1886. Grinenko, V. V., and Čuklina, K. A.
The water regime of vines under irrigated and dry land conditions. [Russian.]
Izv. Otd. estestv. Nauk AN TadžSSR, 1957, No. 20, pp. 59-70, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,367.

In the mountainous regions of Tadžikistan unirrigated vines were found to retain moisture in their tissues by physiological adaptation which sharply reduced water exchange. This adaptation was reflected in an alteration of the free to bound water ratio. Of 3 varieties studied, Rkaciteli, Tajfi Rozovyj and Kišmiš Belyj, the last named was the most sensitive to soil moisture deficits. Although total productivity may be reduced by the absence of irrigation, the vines in this region show great photosynthetic activity, which results in satisfactory yields, good fruit quality and the accumulation of metabolites with consequent resistance to low winter temperatures.

1887. Carrante, V., and Di Prima, S.
Prove orientativi sull'irrigazione dell'uva Regina a pergola nel biennio 1957-58. **(Preliminary experiments on the irrigation of trellised vines of the variety Regina in the two-year period 1957-58.)** [English summary ½ p.]
Ann. Sper. agrar., 1959, **13**: 635-68, bibl. 5, illus.

With a rainfall total of 44 mm. for July and August, 1957, yields were increased by 10% and fruit quality was improved by irrigating 3 times during this period, each vine receiving 150 l. of water. In the following season, which was very dry, an application of 720 l. per vine increased yields by 40%, very slightly reduced the sugar content of the grapes and the percentage, but not the total quantity, of exportable fruit. Infiltration from several furrows between each pair of rows was preferable to digging a shallow basin around each vine and admitting water from a single inter-row channel. Yields were 39% higher from 2·5 × 2·5 m. spacing than from 3 × 3 m.—Staz. agrar. sper. Bari.

Vines—grape composition, storage and marketing.

(*See also* 1535, 2531, 3051.)

1888. Poux, C.
Influence d'un traitement aux silicones sur la maturation du raisin. **(The effect of a silicone treatment on the ripening of grapes.)**
Ann. Physiol. vég., 1959, **1**: 189-97, bibl. 8.

Bunches of grapes detached and dipped in solutions of silicones, in which ethyl acetate or sulphuric ether were the solvents, lost moisture more rapidly than untreated control bunches, probably because these solvents removed the natural waxes from the grape skins. On the other hand, bunches sprayed with an aqueous emulsion of silicones lost less moisture than the controls, the average difference being 18%. Further experiments, with bunches left on the vines, showed a significant reduction of fruit weight as a result of 2 spray treatments, in mid- and late-July, due to a check in the increase of fruit size after the first treatment. The weight of bunches receiving only the late-July treatment was only slightly less than that of the controls. Sugar and acid contents were much the same at harvest in all the treated grapes as in the controls, although the former tended to have higher sugar contents, whereas in mid-August they had been much lower in sugar than the controls.

1889. Ribéreau-Gayon, G.
Influence des facteurs physiques sur la maturation du raisin. **(Effect of physical factors on grape maturation.)**
C.R. Acad. Agric. Fr., 1959, **45**: 588-92, bibl. 6.

In trials on Merlot and Cabernet vines in 1957 and 1958 minimum acidity was correlated with a certain mean humidity, and maturation was delayed if humidity rose above or fell below this mean. The sugars content was increased and acidity was decreased by short pruning (which not only reduced the number of bunches but also induced considerable fruit drop), by leaving vines untipped or by raising the temperature by 4–5° C. The sugars content was decreased and acidity was increased by shading or by artificial lighting at night.—Stat. agron. oenol. Bordeaux.

1890. Robinson, W. B., and others.
Changes in the malic and tartaric acid contents of Concord grapes.
Food Res., 1959, **24**: 176-80, bibl. 13, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-43.

Malic acid and total acid were significantly related to the heat units accumulated between dates of bloom and harvest. Soluble solids and tartaric acid were not significantly correlated with heat units. Pruning affected the soluble solids, but not the rate of decline of acid content. The leaf-to-fruit ratio or leaf exposure may exert more influence on soluble solids than on malic acid content, and this may provide a possible explanation of the above condition.

1891. Portmann, G. (President).
Congrés international pour l'étude scientifique du vin et du raisin, 11-12-13 octobre 1957. **(International congress for the scientific study of wines and grapes, 11-13 October, 1957),** Bordeaux, pp. 77, bibls.

The report consists of 8 papers, mainly concerned with oenology, and opening and closing addresses. A paper by C. Jones (Luxembourg) emphasizes the superiority of unfermented grape juice over wine for improving athletic performance. The B vitamins of grapes and wine are compared by E. Peynaud and S. Lafourcade, and the phenolic compounds by P. Ribéreau-Gayon.

1892. Korobkina, Z. V.
The effect of the degree of ripeness of grapes on their stability during transport and storage. [Russian.]
Sad i Ogorod, 1959, No. 8, pp. 62-4.

Grapes of 7 varieties picked at 3 different stages of ripeness were packed on the day of picking and were examined on arrival in Moscow 16–17 days later. Those picked just before they were fully ripe arrived in the best condition. Grapes picked 7 days earlier had less wastage but were still underripe on arrival.

1893. Lju-Juj-Jan'.
An investigation on the adherence to the stalk and resistance to crushing of grapes. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(6): 41-5, bibl. 4, illus.

In a study of grapes of 271 varieties and seedlings, berry adherence was found to be directly related to flesh texture, size of berry, shape and size of ovary and the number of vascular filaments in the ovary, and also to cell wall thickness. No correlation was found with skin thickness. Resistance to crushing was directly related to strength of attachment, flesh texture, size of berry, cell wall thickness and also to the amounts of cellulose, protopectin and water-soluble pectin in the skin and flesh.

1894. Korobkina, Z. V., and Kočurova, A. I.
The use of potassium metabisulphite against mould fungi. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(8): 28-30, bibl. 2.

Practically all the losses in transport occurring in experimental consignments of grapes of 18 varieties from Uzbekistan to Moscow were due to moulds, in particular *Penicillium glaucum*. Of chemicals tested $K_2S_2O_5$ had the greatest inhibiting action on mould development in stored grapes. In one trial 2·5% $K_2S_2O_5$ in the cork sawdust packing of a standard container reduced decay to 3–4·3% and shatter to 4·9–6·2% after 4½ months storage at 0–3° C. and 85–90% R.H., compared with 79–82% decay and 18–20% shatter in untreated grapes.

1895. Breider, H., Reuther, G., and Wolf, E.
Untersuchungen zum Qualitätsproblem bei Reben-Hybriden. (**Studies on the problem of quality in vine hybrids.**)
Züchter, 1959, **29**: 317-34, bibl. 32, illus.

Hens which drank wine from hybrid vines (*Vitis vinifera* × American wild species) developed abnormalities of the blood and liver, which were not found in those which drank vinifera wines or water.

Temperate nuts.

(*See also* 1507, 1528, 1536, 1613, 1620, 1724, 1746, 1946.)

1896. Prutenskij, D. I., and Zaikina, A. A.
Almonds (*Amygdalus communis* L.) in south Kirgizija. [Russian.]
Tr. Inst. Bot. Akad. Nauk KirgSSR, 1958, No. 3, pp. 125-37, bibl. 2, illus.

Distribution of, and physiological differences between, sweet and bitter types.

1897. (Kester, D. E., and Jones, R. W.)
Almonds that fit today's needs.
Agric. Res. Wash., 1959, **8**(2): 14, illus.

Californian work on breeding and selection for small kernels for use in confectionery.

1898. Milella, A.
Ricerche sulla biologia fiorale del mandorlo in Sardegna. (**Studies on the floral biology of almonds in Sardinia.**)
Riv. Ortoflorofruttic. ital., 1959, **43**: 322-32, bibl. 29, illus.

The flowering periods are shown for 14 almond varieties, for which the results of tests on self- and inter-compatibility are also given. Self-compatibility was evident, but only to a very slight extent, in 4 varieties.

1899. Milella, A.
Contributo allo studio del sistema radicale del mandorlo. (**Contribution to the study of the root system of almond trees.**)
Stud. sassar., Sez. III, 1958, 1959, **6**: 172-87, bibl. 3, illus.

The horizontal extension of the roots of the almond trees examined filled an area approximately twice as large as that of the crown, even in reasonably deep soil, and few roots were found below 40 cm. from the soil surface. Close spacing and cover cropping (involving competition for soil moisture and cultivation injury to the tree roots) are deprecated for Sardinia.

1900. Maurer, K. J.
Zur Frage der Wirtschaftlichkeit der Haselnusskultur. (**Are hazel nuts an economic proposition?**)
ErwObstb., 1960, **2**: 10-12, bibl. 11.

Not for large scale planting in Germany.

1901. Zatykó, I.
Zur Frage der vegetativen Vermehrung der Walnussbäume. (**On the vegetative propagation of walnuts.**)
Dtsch. Gartenb., 1959, **6**: 251-3, illus.

Further details are added to the author's method of growing walnuts on their own roots in the nursery [see *H.A.*, 29: 82]. Within two years rooting was induced in 70% of the experimental seedlings.—Inst. hort. Res., Budapest.

1902. Popa, P., and Constantinescu, N.
Altoirea nucului direct în pepinieră. (**Grafting walnuts directly in the nursery.**) [English, French, Russian and German summaries ⅔ p. each.]
Grăd. Via Liv., 1959, **8**(6): 39-42 + summaries, illus.

The most successful of 3 methods of budding walnuts, shield budding on to *Juglans regia*, is described. In Roumania budding should be carried out between 15 June and 15 July.

1903. Bode, H. R.
Über den Zusammenhang zwischen Blattenfaltung und Neubildung der Saugwurzeln bei *Juglans*. (**The relation between leaf expansion and the formation of feeder roots in *Juglans*.**)
Ber. dtsch. bot. Ges., 1959, **72**: 93-8, illus., from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 5,546.

In *Juglans regia* the majority of the feeder roots are lost at leaf fall. Sap flow in spring is not affected by this loss of absorbing roots, but it appears that leaf expansion is dependent upon the formation of new feeder roots. This occurs only when the soil temperature rises to 10–15° C.

PLANT PROTECTION OF TEMPERATE FRUITS.

General.

(*See also* 1604, 3016, 3041, 3050.)

1904. LIVINGSTON, J. E., AND HILBORN, M. T.
The control of plant diseases by chemotherapy.
Econ. Bot., 1959, **13**: 3-29, bibl. 222, illus.

A review, covering fire blight, bacterial blights of beans, tobacco wildfire and many fungal and virus diseases of horticultural crops.

1905. WEST OF SCOTLAND AGRICULTURAL COLLEGE.
Spray guide for the amateur fruit grower.
Adv. Leafl. W. Scot. agric. Coll. **63**, revised 1959, pp. 4.

Treatments to control the main pests and diseases of tree and small fruit crops in West Scotland.

1906. GEARD, I. D.
Diseases of walnuts and mulberries.
Tasm. J. Agric., 1959, **30**: 252-5, illus.

The collection and burning of fallen leaves in autumn is recommended for control of mulberry leaf spot (*Septogloeum mori*), followed by a 6:4:40 bordeaux spray when the buds begin to swell, and a half strength spray a fortnight later. A third spray at 2:4:40 may be necessary after fruit set in wet weather. Similar sanitary measures, including the removal of infected shoots, and the first 2 sprays are effective against bacterial blight of mulberry (*Pseudomonas mori*). The removal and burning of affected shoots is recommended for the control of mulberry canker and die back (*Gibberella moricola* = *Fusarium lateritium*). For bacterial blight of walnuts (*Xanthomonas juglandis*) burning infected shoots and the application of 5:2:100 bordeaux containing 1¼ pints of white oil per 100 gal. at early pre-bloom, late pre-bloom and early post-bloom are recommended.

Non-parasitic disorders.

(*See also* 1705.)

1907. ATKINSON, J. D., CHAMBERLAIN, E. E., AND HUNTER, J. A.
Cherry variegation in New Zealand.
N.Z. J. agric. Res., 1959, **2**: 938-44, bibl. 11, illus.

Considered to be the same as virus-like variegation in Europe and cherry white crinkle in N. America, this non-infectious disease is perpetuated by bud-grafting from affected trees. Both scion and stock should be selected from material free from the disease, which is thought to arise from bud sports. —D.S.I.R., Auckland.

1908. BOYD, A. E. W., AND RUBENS, T. G.
Observations on dieback of raspberries.
Gdnrs' Chron., 1959, **146**: 242, 256-7, bibl. 16.

The disease has been serious and widespread over the past 8–9 years, especially in Malling Promise. In affected plants only individual fruiting canes are affected; the rest of the crown and roots and the production of young canes are normal. No primary pathogen has been consistently isolated from affected canes. Observations suggest that the trouble may be greatly increased by leaving the canes untied over winter, owing to wind rocking. The disease is frequently severe in low-lying areas and may be increased by mulching. It appears that the cause is primarily physical or mechanical, the resulting damage allowing semi-parasitic organisms to penetrate the base of the stem.—Edinb. E. Scotland Coll. Agric.

1909. MARTELLI, G. P.
Avvizzimento di grappoli di uva in Puglia. **(Withering of grape bunches in Apulia.)**
Inf. fitopat., 1959, **9**: 185-7, illus.

In some instances the inner part of the curve of the bunch stalk was deeply furrowed transversely, the internal tissues were strained, and on the corresponding half of the bunch the fruit withered. In other cases the stalks of certain sections of the bunch were partially severed from the main stalk, and the grapes on these were withered. These abnormalities were a common feature of vines grafted on 420A and 157-11, rootstocks that induce dense crowding of grapes on the bunch. They could probably be avoided by chemical thinning.

Viruses.

(*See also* 1502, 2358, 3025.)

1910. CANOVA, A.
Le virosi dei fruttiferi. **(Virus diseases of fruit trees.)**
Frutticoltura, 1959, **21**: 591-606, illus.

A review of their economic importance and control measures. [For a previous article in this series see *H.A.*, 30: 392.]

1911. MORVAN, G.
La protection des végétaux en arboriculture fruitière. Le problème des maladies à virus. **(Plant protection in top-fruit growing. The problem of virus diseases.)**
Rev. Agric. Brux., 1959, **12**: 677-84, bibl. 3.

A review of the current indirect methods of control and possibilities of their enforcement.

1912. Ciferri, R.
Introduzione alle ricerche sulle virosi dei fruttiferi arborei. **(An introduction to studies on virus diseases of fruit trees.)**
Ricerche sulle virosi delle piante arboree effettuate in Pavia-Voghera. **(Studies carried out in Pavia and Voghera on virus diseases of trees.)**
Not. Mal. Piante, 1959, No. 47/48, pp. 17-28, and No. 49/50, pp. 215-28.

The introductory article describes the work in progress in Italy, and gives a list of the virus diseases of apple, pear, quince, cherry, flowering cherry, plum, peach, almond, hazel, fig, persimmon and vine under investigation. The second article gives a brief account of diagnostic techniques and extends the list of viruses under investigation.

1913. Kegler, H.
Untersuchungen über Virosen des Kernobstes. I. Das Apfelmosaikvirus. **(Studies on virus diseases of pome fruits. I. Apple mosaic.)** [English summary ½ p.]
Phytopath. Z., 1959, **37**: 170-86, bibl. 30, illus.

Differences in resistance to mosaic have been found in several apple varieties and *Malus* species. The virus was inactivated in diseased shoots of Lady Sudeley by hot air treatment (70° C. for 10 min.) Hot water treatment was not effective.—Inst. Phytopath., Aschersleben.

1914. Hunter, J. A., Chamberlain, E. E., and Atkinson, J. D.
Note on a modification in technique for inactivating apple mosaic virus in apple wood by heat treatment.
N.Z. J. agric. Res., 1959, **2**: 945-6, bibl. 6.

Complete inactivation of the virus appears to have been obtained by heat treatment, at 37° C. for 38–40 days, of healthy seedlings which had been budded 26 days previously with buds from trees infected with mild, moderate and severe strains of the virus. More recent work has indicated that, in most varieties of apple, buds will unite and survive when the heat treatment is started 10 days after budding, and that certain varieties, e.g. Delicious on M.XVI, will survive when treatment is started only half-an-hour after budding.—D.S.I.R., Auckland.

1915. Bovey, R.
Note sur la transmission du virus du bois souple du pommier au poirier et vice versa. **(Transmission of the rubbery wood virus from apple to pear and vice versa.)**
Landw. Jb. Schweiz, 1959, **8**: 655-7, bibl. 1, illus.

The rubbery wood virus has for the first time been ransmitted from apple to pear using the budding echnique. The virus was found to multiply n pear and could be re-transmitted to apple.

1916. Schmid, G.
Viröse Berostung und Rissbildung an Äpfeln. **(Russeting and cracking of apples caused by a virus.)**
Schweiz. Z. Obst- u. Weinb., 1960, **69**: 54-60, bibl. 3, illus.

The author continued H. Fischer's study of the disorder [see *H.A.*, 25: 2609] and came to the conclusion that it is transmissible by grafting from affected to healthy trees. The presence of two viruses, or of two strains of the same virus, is suspected, one causing russeting without star cracking in Boskoop and Berlepsch, the other inducing symptoms of star cracking and necrotic russeting in Glockenapfel, Champagne Reinette and Ontario among other varieties. The disease was easily transmissible within a group of varieties; but not from one group to another. In certain varieties the virus appears to remain latent. Hence growers may be able to overcome the disease by using such varieties for topworking affected trees.

1917. Issa, E.
A mancha anelar do marmeleiro. **(Ring spot disease of quince.)**
Biológico, 1959, **25**: 64-7, bibl. 9, illus.

The cause has proved to be a virus, probably specific to quinces. It produces chlorotic interveinal patches on the leaves, phloem necrosis in the stems, and deformation and internal browning of the fruits.

1918. Mather, S. M.
Registration and certification of cherry trees in California.
Fruit Var. hort. Dig., 1959, **14**(1): 16-18.

For virus control.

1919. (Milbrath, J. A.)
Virus discovery shortens time needed for tests.
Bett. Fruit, 1959, **54**(4): 7.

Most of the symptomless viruses of stone fruit trees can be detected within 6 weeks by budding on to the indicator variety of Japanese cherry, Shiro-fugan. Shiro-fugan and many other ornamental cherries carry a little-cherry virus which attacks both sweet and sour commercial varieties; so no ornamental varieties should be grown near cherry orchards or nurseries. It is also reported that the Eckelrader disease, a virus previously restricted to Europe, has been found in Oregon.

1920. Baumann, G.
Die Verbreitung der Stecklenberger Krankheit der Sauerkirsche und der Ringfleckenkrankheit der Süsskirsche in Obstanlagen und Baumschulen. **(The extent of spread of the Stecklenberg disease on sour cherry and ringspot disease on sweet cherry in orchards and nurseries.)** [English and Russian summaries 11 and 13 lines.]

NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 173-7, bibl. 6.

Extensive observations in cherry orchards of the Altmark, Saxony and Thuringen showed 96% infection with Stecklenberg virus in sour cherries but only some 5% infection in nurseries. In older sweet cherry plantations about 10% infection with ring spot virus was also discovered. Both these viruses are obviously spreading. Considerable progress has been made in the provision of virus-free *Prunus avium* nursery material, and a note is given on this preliminary work.

1921. Nyland, G., and Thomas, H. E.
A new strain of ring pox virus in Royal apricot.
Phytopathology, 1959, **49**: 338-9, bibl. 3, illus.

Graft-transmissible among Royal and to a lesser degree Tilton apricots, but not transmissible to peaches.

1922. Ciferri, R., and Corte, A.
Trasmissibilità della degenerazione infettiva della vite ad altre specie arboree. (**Transmissibility of infectious degeneration of vines to other woody species.**)
Inf. fitopat., 1959, **9**: 346-8, illus.
Ciferri, R., Corte, A., and Scaramuzzi, G.
Suscettibilità di piante arboree alla sindrome virosica della degenerazione infettiva della vite. (**Susceptibility of woody plants to the virus syndrome of infectious degeneration of vines.**) [English summary ¼ p.]
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 335-50, bibl. 7, illus.

The first paper covers the same ground as two earlier papers [see *H.A.*, 30: 406]. The second is a fuller account, in which the authors have slightly modified their original conclusions. Glossy privet (*Ligustrum lucidum*) has proved an excellent, and Mazzard F.12/1 cherry a good, indicator of this vine disease. Other species in which the symptoms await confirmation are: seedling myrobalan, *Rhamnus purshiana*, *Platanus orientalis*, *L. ovalifolium*, *Acer ginnala*, *Mahonia japonica*, *Datura arborea*, *Ampelopsis quinquaefolia*, *Aucuba japonica*, *Robinia pseud-acacia decaisneana* and ivy (*Hedera helix*).

1923. Salerno, M., and Musumeci, A.
Contributo allo studio della degenerazione infettiva della vite in Sicilia. (**Contribution to the study of infectious degeneration of vines in Sicily.**) [English summary ⅓ p.].
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 310-34, bibl. 23, illus.

The number of endocellular cords in the xylem of vines infected by this disease was not significantly correlated with the external symptoms or with the severity of the disease, and varied widely from plant to plant and even from shoot to shoot on a single vine. Thus the value of this feature in diagnosis seems doubtful.

Bacteria.

(*See also* 1540, 1667, 1904.)

1924. Cole, M.
Bacterial rotting of apple fruit.
Ann. appl. Biol., 1959, **47**: 601-11, bibl. 4, illus.

Studies on isolates considered to be *Pseudomonas pomi* and *P. melophthora*.

1925. Sarger, J.
Étude de l'influence des traitements aux hormones de croissance sur le développement de tumeurs infectieuses sur boutures de *Prunus cerasifera*. (**Study of the effect of growth-substance treatment on the development of infectious tumours on *Prunus cerasifera* cuttings.**)
C.R. Acad. Agric. Fr., 1959, **45**: 345-9, illus.

In sterilized soil the application of IAA or IBA to cuttings stimulated development and improved establishment, but in soil infected with *Agrobacterium tumefaciens* it favoured the development of (apparently) bacterial galls.—Stat. arbor. fruit., I.N.R.A., Pont de la Maye (Gironde).

1926. Onozawa, Y.
Studies on mulberry blight. Part 1. On physiological characteristics in relation to mulberry blight.
Jap. J. Breed., 1958, **7**: 186-90, from *Rec. Res. Fac. Agric. Tokyo*, 1959, No. 8 (1957-1958), Abstr. 7.

At leaf fall the insoluble carbohydrate:total sugar ratio in the bark was higher in varieties resistant to blight [*Pseudomonas mori*?], i.e. hardening was more advanced in these varieties. No correlation was found between blight resistance and water content, and the total carbohydrate content of the bark showed little change regardless of variety, locality and season.

Fungi.

(*See also* 1502, 1572, 1666, 1694, 1785, 1787, 1788, 1793, 1894, 2017, 2024.)

1927. Pettinga, J. J., and Vlasveld, W. P. N.
Kankerbestrijding in nieuwe banen? (**A new method of canker control?**)
Fruitteelt, 1959, **49**: 1062-3, illus.

For the control of apple canker 2 applications of copper, preferably copper oxychloride, in autumn, one just after the beginning of leaf fall and the other just after it has finished, have given very promising results. A third spray in spring, at bud burst, is advisable. Mercury sprays have also given promising results.

1928. Schander, H.
Beziehungen zwischen Mehltaubefall und Trockenschäden bei Äpfeln. **(Relationships between the incidence of mildew and drought injury in apple trees.)**
Mitt. ObstVersuchsringes Jork, 1959, **14**: 214-17, bibl. 2.

Premature cessation of shoot growth on apple trees as a result of drought is a symptom of weakening resistance to mildew. The danger becomes acute when the drought is followed by warm rains and new growth is exposed to infection. In that case protective spraying is urgently called for. Tabulated data show the relationship between mildew incidence and drought resistance in 6 apple progenies.

1929. Ward, J. R.
Apple powdery mildew control in Tasmania.
Tasm. J. Agric., 1959, **30**: 198-204, bibl. 6, illus.

Field experiments, mainly with the spray-sensitive variety Sturmer, were carried out in 3 seasons to evaluate fungicides for the control of *Podosphaera leucotricha*. Colloidal sulphur sprays, 2–2½ lb. per 100 gal., with 1½ lb. thiram or 2 lb. captan gave good control of mildew, without causing russeting, and in addition afforded protection against ripe spot (*Neofabraea perennans* and *Gloeosporium album*). Karathane at ½–1 lb. per 100 gal. also controlled mildew but was ineffective against black spot (*Venturia inaequalis*), for which it had to be combined with thiram or captan.

1930. Gayford, G. W.
Oriental fruit moth. Powdery mildew of apples. Black spot control in apples.
J. Agric. Vict., 1959, **57**: 665-6.

The recommended method of controlling the oriental fruit moth on peaches remains unchanged, viz. spraying with 0·1% DDT plus 0·05% TDE at monthly intervals from early October. Fair control of powdery mildew of apples has been obtained by including Karathane at a concentration of ¾ lb. per 100 gal. in the codling moth sprays. For black spot [scab] it is suggested that bordeaux should be used at bud burst, lime sulphur at the % blossom stage and thereafter thiram and captan at 10–14-day intervals while conditions continue to favour development of the disease.

1931. Bazier, J.
La lutte contre la tavelure. Contrôle pratique des possibilités d'infection. **(Control of apple and pear scab. Practical ways of determining the likelihood of infection.)**
Bull. hort. Liège, 1960, **15**: 39-43, illus.

Methods developed at the Grand-Manil College of Horticulture for checking ascospore discharge, determining the susceptible phase of apple and pear trees, studying the persistence of fungicides on the leaves, and determining leaf temperature and surface moisture for use with the Mills table are described. An apparatus has been developed for the simultaneous recording of temperature variation and periods of dampness.

1932. Lembcke, G.
Zum Problem der Fusikladiumspritzungen unter besonderer Berücksichtigung des Blattbefeuchtungsdauerschreibers. **(The problem of spraying for scab control, with special reference to an apparatus for measuring surface moisture on leaves.)** [Russian and English summaries 25 and 18 lines.]
NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 127-34, bibl. 43, illus.

The essential requirements for an adequate scab warning service are discussed with reference to the literature. An apparatus is described by which surface moisture on leaves may be measured.—Dtsch. Akad. LandwWiss., Berlin.

1933. Anon.
Il rugiadografo nella pratica fitoiatrica. **(The use of the dew recorder in plant protection.)**
Inf. fitopat., 1959, **9**: 300, illus.

The apparatus, perfected by the Lambrecht Society of Göttingen, has given good results in Italy in recording dew or moisture deposition on leaves of apple, pear, peach, vine and hemp, and is being tested with a view to its adoption for Mills-chart forecasting of apple scab infection.

1934. Olsson, K.
En inventering ab gren- och knoppskorv på äpple. **(Estimating the incidence of twig and bud scab on apples.)**
Växtskyddsnotiser, 1959, **23**: 5-9, illus.

In Sweden.

1935. Cano, F., and Martelli, R.
Prove di lotta contro la ticchiolatura del melo con Mericol, fungicida organomercurico. **(Tests of an organic mercury fungicide, Mericol, against apple scab.)**
Not. Mal. Piante, 1959, No. 49/50, pp. 63-8, bibl. 9.

The use of phenylmercuric naphthenate proved effective against apple scab in the field, and, provided only about 6 or 7 applications were made, the last in early June, mercury residues in the fruit were below the legal limit of tolerance.

1936. (Richardson, F.)
"Black spot" wilts under new attack.
Fruit World, Melbourne, 1959, **60**(10): 35.

Blue Bell Melprex 65, containing 65% *n*-dodecylguanidine acetate, has proved very effective against apple and pear scab.

1937. BOTTING, G. W.
Brown rot of stone fruits.
J. Agric. S. Aust., 1959, **63**: 64-7, bibl. 1, illus.

The various effects produced by the disease are described. Evidence has been found that *Carpophilus* beetles can spread infection. In control sanitation is all-important. The recommended spray programme for peaches, nectarines, plums and apricots is outlined. A ripening process suitable for canning peaches is being developed. Fruit is picked while still slightly immature and held at a controlled humidity and at a temperature which promotes ripening but is too high for rot development.

1938. CICCARONE, A.
Il marciume bruno del mandorlo. (**Brown rot of almonds.**)
Inf. fitopat., 1959, **9**: 257-61, illus.

Monilia (*Sclerotinia*) *laxa* is difficult to control directly. The removal of all affected shoots before leaf fall is very important. Bordeaux mixture at 3% as an eradicant has given only moderate control. Protective sprays should be applied during flowering, the first with 1% bordeaux and later ones (if flowering is protracted) with the less phytotoxic organic fungicides.

1939. S—, M.
Il "corineo" del ciliegio. (**Coryneum blight of cherry trees.**)
Tecn. agric., 1959, **11**: 256-60, illus.

Varieties resistant and susceptible to *Clasterosporium carpophilum* and control with bordeaux and ziram.

1940. CAKADZE, T. A.
The effect of a toxin from *Cytospora leucostoma* on the cells of plants. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 75-7, bibl. 4, illus.

It was established that *C. leucostoma*, causing die-back of stone fruit trees, secretes a toxin which changes the physiological status of the affected tree. Both cell division and permeability are adversely affected. The toxin also increases peroxidase and polyphenoloxidase activity and the intensity of respiration, but reduces the respiratory coefficient.

1941. MORIONDO, F.
Primi indirizzi nella lotta contro il cancro del pesco. (**Preliminary attempts at controlling peach canker.**)
Progr. agric., 1959, **5**: 1403-5, illus.

Peach canker, caused by *Fusicoccum amygdali*, was best controlled by ziram or by TMTD.

1942. CRADY, E. E., AND WOLF, F. T.
The production of indole acetic acid by *Taphrina deformans* and *Dibotryon morbosum*.
Physiol. Plant., 1959, **12**: 526-33, bibl. 21.

Evidence is presented for the conversion of tryptophane to indoleacetic acid by *Taphrina deformans* and *Dibotryon morbosum*. This production of IAA is briefly discussed in relation to the proliferation induced in peach leaves affected with leaf curl and in plum and cherry trees affected with black knot disease.—Vanderbilt Univ., Nashville, Tenn.

1943. GIUSSANI-COSOLO, A.
Prove con ziram contro le malattie crittogamiche del pesco. (**Ziram for peach diseases.**) [English summary 4 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 165–6.

Tests at the Phytopathological Observatory at Gorizia again showed the efficacy of ziram for controlling leaf curl and gum spot of peach trees, when used both in the winter at 0·6–0·8% and in spring and summer at 0·25%. It was also found possible to add 1% ziram to white (summer) oil with parathion.

1944. SARASOLA, A. A., AND DE SARASOLA, M. A. R.
Nuevos tratamientos contra el torque del duraznero en la Argentina. (**New treatments for peach leaf curl in Argentina.**) [English summary ⅓ p.]
Rev. Invest. agric. B. Aires, 1959, **13**: 111-16, bibl. 8.

In a trial to determine whether autumn spraying (mid-May) could replace the customary pre-bud-burst spraying (mid-October) for the control of *Taphrina deformans*, bordeaux mixture at 1·25 and 2·0%, 76% ferbam at 2·5‰ and 76% ziram at 3·6‰ gave equally effective control, namely, less than 2% infected shoots compared with 23–24% in the control, whether they were applied in the autumn at 2·2 l. per tree or in the spring at 1·2 l. per tree.

1945. N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Rust of stone fruits.
Agric. Gaz. N.S.W., 1959, **70**: 258-60, illus.

Spray programmes recommended for use against *Tranzschelia pruni-spinosae*.

1946. MERENDI, A.
Il dramma del castagno. (**The chestnut drama.**)
Ital. agric., 1959, **96**: 990-5.

Chestnut trees in Italy are not so extensively affected by ink disease (*Phytophthora cambivora*) as was predicted, but appear to have developed resistance. The introduction from Japan of *Castanea crenata* as a direct producer or as a rootstock was not so effective in controlling the disease as its sponsors hoped. The more recent spread of bark canker (*Endothia parasitica*) has not so far been checked by any of the control measures applied, and introduction of the resistant

Chinese species *C. mollissima* has been suggested. Meanwhile, the use of coppice shoots is advocated or propagation, because these have shown a ertain resistance even when taken from infected arent trees.

947. Poluškina, N. S.
Septoriosis of pistachio. [Russian.]
Bjull. nauč.-tehn. Inf. Tadž. n.-i. Inst. Sadovod. Vinogradst. i subtrop. Kul'tur, 1957, No. 1, pp. 67-9, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,564.

n Tadižkistan *Septoria pistaciae* causes heavy ield reductions in pistachio. The disease was ound to develop rapidly during the summer and y September damaged 98–100% of the leaves. n control experiments the best results were given ith 1% bordeaux to which 5% copper sulphate as been added.

948. Gilles, G.
Biology and control of *Botrytis cinerea* Pers. on strawberries.
Höfchen Briefe, 1959, **12**: 141-68, bibl. 17.

usceptibility was high in fully mature flowers and pe fruit. Among various fungicides tested TMTD ave the best control and captan was almost as fective. The former was not improved by the ldition of sulphur. Under the conditions of the st season, application by atomizing was more, nd by dusting less, effective than conventional praying. Sulphur imparted an unpleasant flavour strawberries which were canned after treatment, ut neither TMTD nor captan had any such effect.

949. Kenzo, S., Yoshihiro, H., and Yasuo, S.
Studies on screening of fungicides. 1. The decrease of fungicidal action of several fungicides against *Botrytis cinerea* Pers. ex Fr. [Japanese, with English summary ½ p.]
Misc. Publ. hort. Div. Tohoku agric. Exp. Stat. **15**, pp. 6, bibl. 8, reprinted from *A.R. Soc. agric. Chemicals N. Japan*, 1957, No. 6, pp. 15-20.

aboratory tests on the inhibiting effect of several ngicides on spore germination have shown an riazine derivative (2,4-dichloro-6-(*o*-chloro-ilino)-*s*-triazine) to be as effective as captan in ntrolling *Botrytis* rot of strawberries.

950. McCarthy, G. J. P., and Teakle, D. S.
A crown rot of strawberry caused by *Phytophthora parasitica*.
Qd J. agric. Sci., 1959, **16**: 73-7, bibl. 3, illus.

ow incidence suggests that rotation will provide equate control.

51. Kundert, J.
Auftreten und Bekämpfung der Rebenperonospora im Jahre 1959. **(Incidence and control of downy mildew in vines in 1959.)**
Schweiz Z. Obst- u. Weinb., 1960, **69**: 61-6.

Observations in 1959 led to the conclusion that the first outbreaks of downy mildew are unpredictable in view of the differences in climate between different vine growing areas. In general, rainfall below 10 mm. was shown to discourage mildew infection, and it was also found that periods of low temperature (below 13° C.) inhibit the fungus more severely than had been suspected. The experience of several years suggests that it is preferable to delay the first spray application until the first week in June and also to carry out a late treatment during the first ten days of August. Soon after flowering copper preparations should replace organic fungicides.

1952. Zanotti, L.
La peronospora della vite nel 1957 e la lotta con acuprici. **(The control of vine downy mildew with non-copper fungicides in 1957.)**
Not. Mal. Piante, 1959, No. 49/50, pp. 69-89.

Two non-copper fungicides Aspor A and Aspor C, both largely made up of zineb, again proved effective against vine downy mildew, and the recommendation is made that treatments with these substances should be wholly substituted for that with bordeaux for treating this disease. Reference is also made to their equally good effects when used against diseases of peaches, plums, apples and tomatoes.

1953. Cosmo, I.
Gli acuprici nell'ultima campagna antiperonosporica. **(Last year's experience with non-copper fungicides for control of vine downy mildew.)**
Riv. Vitic. Enol., 1959, **12**: 403-7.

In the Venice area the best results were obtained with an application of sulphur dust when the shoots had reached 7–8 cm. in length, followed by spraying (the frequency depending on weather conditions) with zineb mixed with colloidal wettable sulphur, and finally applying sulphur mixed with copper oxychloride when the grapes were as large as peas.

1954. Rajkov, E.
New preparations for downy mildew control on vines. [Bulgarian.]
Bjull. rastit. Zaščita, 1957, **6**(1): 51-4, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,568.

During the severe mildew year 1956, a number of foreign copper and non-copper fungicides were compared, 10 applications being made at times related to incubation periods. Excellent results, no way inferior to those with bordeaux, were obtained with 0·5% Vitigran, a copper oxychloride preparation from Western Germany. All the other compounds were either less effective than bordeaux or had undesirable side effects. Vitigran and bordeaux also possessed the longest residual action.

1955. Pine, T. S.
Development of the grape dead-arm disease.
Phytopathology, 1959, **49**: 738-43, bibl. 12, illus.

A study on the mode of infection by *Phomopsis viticola*. [For control see *H.A.*, 28: 282.]

1956. Graniti, A.
Un anno di infruttuosa lotta contro la "Muffa grigia" (*Botrytis cinerea* Pers.) delle uve da tavola in Puglia. (**A year of unsuccessful attempts to control grey mould of table grapes in Apulia.**) [English summary ½ p.]
Not. Mal. Piante, 1959, No. 49/50, pp. 167-87, bibl. 27, illus.

Treatments given with various forms of the following substances generally proved unsuccessful in controlling outbreaks of *Botrytis cinerea* in September and October: Captan, TMTD, PCNB, RDNB, zineb, ziram. The first two fungicides were slightly better than the rest.

1957. Weltzien-Stenzel, M.
Studies on the germination biology of conidia of *Uncinula necator* (Schwein.) Burr.
Höfchen-Briefe, 1959, **12**: 29-52, bibl. 43, illus.

Seasonal variations in the susceptibility of greenhouse grape vines are among points discussed.

1958. Casarini, B., Cano, F., and Martelli, R.
Nuovi fungicidi a base di fenoli nitrati. (**New fungicides derived from nitrophenols.**) [English summary ¼ p.]
Ann. Sper. agrar., 1959, **13**(4), Suppl. pp. i-ix, bibl. 4.

Tobacco mildew [*Erysiphe cichoracearum*?] was effectively controlled, without harm to the crop, by mononitro-2-caprylphenyl crotonate, a compound related to Karathane. This and 3 other new nitrophenols were inferior to Karathane as regards the control of powdery mildew [*Uncinula necator*] of vines, but all 4 were significantly more effective than zineb against this disease. Next to Karathane came nitro-nonylphenyl crotonate, followed in effectiveness by mononitro-2-caprylphenyl butyrate, both of which were distinctly superior to mononitro-2-caprylphenyl crotonate or nitro-octylphenyl crotonate.—Lab. sper. Pat. veg. Bologna.

1959. Šterenberg, P. M.
Concerning the nature of spotted necrosis. [Russian.]
Vinodelie i Vinogradarstvo, 1959, **19**(7): 28-33, bibl. 10.

Vine cuttings taken in October from shoots covered with parchment paper before 20 July developed much less spotted necrosis, during winter storage, than cuttings from uncovered shoots. Additional covering, to darken the parchment-covered shoots, gave little extra protection. Covering shoots on 27–29 August was not effective, thus indicating that infection takes place between about 20 July and 27 August. Cuttings from covered shoots that were artificially inoculated from diseased wood or from a pure culture of *Rhacodiella* sp. did develop necrosis, whereas cuttings from covered shoots that were not inoculated remained healthy. The resistance of 23 grape varieties to infection was investigated. Infection varied from 0 to 100%. Work on fungicidal control is in progress.

Nematodes.

(*See also* 2358, 3023.)

1960. Marinari, A.
I nematodi e gli alberi da frutto. (**Nematodes and fruit trees.**)
Inf. fitopat., 1959, **9**: 158-60 and 188-90.

A review, including various methods of control.

Mites.

(*See also* 1602, 2000, 2024.)

1961. Pinto-Ganhão, J. F.
Principais ácaros das fruteiras. Actuais meios de luta. (**The principal mites of fruit trees. Modern control methods.**)
Agros, 1959, **42**: 103-24, bibl. 47, illus.

A review, with special reference to *Metatetranychus ulmi*, *Bryobia praetiosa* and *Tetranychus urticae*, and to acaricides in current use.

1962. Fisher, R. W.
Polybutenes—a new control for phytophagous mites.
J. econ. Ent., 1959, **52**: 1015, bibl. 1, illus.

A 5% emulsion of 100 ml. Indopol H-1500 + 100 ml. water + 3 ml. Emulsifier G-3300, sprayed in the greenhouse on melon, bean, rose, honeysuckle and peach plants, gave excellent control of the two-spotted spider mite, *Tetranychus telarius*.—Canada Dep. Agric., Vineland Stat., Ont.

1963. Lloyd, N. C.
Red mite (*Bryobia praetiosa*).
Agric. Gaz. N.S.W., 1959, **70**: 245-7, illus.

Recommended spray programmes for pome and stone fruits.

1964. Bua, G., and Biagini, E.
Serie di esperimenti di lotta contro il ragno rosso, *Metatetranychus ulmi* Koch (Oudms 1931). (**A series of experiments on control of the red spider mite, *Metatetranychus ulmi*.**) [English summary ½ p.]
Riv. Ortoflorofruttic. ital., 1959, **43**: 345-61, bibl. 2.

In a comparison of winter treatments of a mixed apple and pear orchard, the best and most lasting results were given by 3–5% emulsions of mineral oil containing small proportions of DNOC [see also *H.A.*, 28: 297]. White oils with added hosphoric esters were less effective. Selective caricides used for summer treatments were greatly educed in effectiveness by high temperature and right sunlight following their application. The ost promising of those tested was a liquid formulation of paradichlorophenyltrichloroethanol, ut none gave complete protection for longer than 1 days. Systemic acaricides (Systox, Metaystox and Ekatin), applied to the soil under oung trees, were ineffective.

965. Oatman, E. R.
European red mite control and population studies on apple in Wisconsin.
J. econ. Ent., 1959, **52**: 871-7, bibl. 17.

ienite, Mitox and Ovex applied as pre-blossom caricides gave season-long control of the European ed mite, *Panonychus ulmi*, on apples. Aramite, hlorobenzilate, demeton, Kelthane and Mitox, sed as foliage sprays, were effective in reducing nd maintaining the mite populations at a low vel for the rest of the season. By 1 September, owever, when there was an abrupt and natural ecline in all mite populations, those on the treated ees exceeded those on the untreated trees, and ey laid more overwintering eggs. In the following year populations developing from these eggs ere higher and reached peaks earlier than those n trees which had not been treated previously.—Vis. agric. Exp. Stat.

966. Mathys, G.
Tetranychus viennensis Zacher, l'acarien de l'aubépine. (***Tetranychus viennensis*, the hawthorn mite.)**
Rev. romande Agric. Vitic., 1960, **16**(1): 6-7, bibl. 3, illus.

his pest has become widespread on fruit trees articularly apple) in the region of the Lake of eneva. Features distinguishing it from *Panochus ulmi* are described. In laboratory experiments with apple seedlings all the acaricides which e recognized as effective against *P. ulmi* gave tisfactory control of *T. viennensis*, and 0·5% ettable sulphur was equally effective. Treatment ould be applied shortly before flowering and peated a fortnight later. Combined treatments r mite and insect pest control have given good sults.

67. Taksdal, G.
Nytt skadedyrmiddel med lovande verknad mot solbaergallmidd (*Eriophyes ribis* Nal.). **(A new acaricide with a promising action against the black currant gall mite.)**
Frukt og Baer, 1959, **12**: 12-18, bibl. 4, illus.

veral acaricides tested in laboratory and field als gave uncertain results, but endrin achieved cellent control of *Phytoptus ribis* if applied mediately before and after flowering.—Norgian Plant Protection Service.

1968. Minder, I. F.
Data on the biology of pear blister mite, *Eriophyes pyri*. [Russian, with English, summary.)
Zool. Ž., 1957, **36**: 1007-15, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 78,314.

The life history of the mite in the Rjazan region is described. The most susceptible pear variety is Tonkovetka and the most resistant Bessemjanka. The mite *Typhlodromus rhenanus* and larvae of *Arthrocnodax* sp. were found to occur as predators on the mite. Of chemicals tested, the best control was obtained with 0·5% lime-sulphur applied at bud burst.

1969. Herrera Villamil, G.
Biología y control de la falsa arañita roja de la vid (*Brevipalpus chilensis* Baker). **(Biology and control of the vine red spider mite.)** [English summary ½ p.]
Agric. téc. Chile, 1958, **18**: 35-42, bibl. 11, illus.

Of 19 acaricides compared, 25% emulsions of Chlorobenzilate and of Dimite, each applied at 150 c.c. per 100 l. water, gave the best results, namely, over 90% control 17 days after application. Treatment should begin in early spring and be repeated every 15–20 days.—Estac. nac. Ent., La Cruz.

1970. Michelbacher, A. E.
Spider mites on walnut in Northern California.
J. econ. Ent., 1959, **52**: 936-9, bibl. 19.

The principal species are the Pacific spider mite (*Tetranychus pacificus*), the two-spotted mite (*T. telarius*) and the European red mite (*Panonychus ulmi*). Populations of Pacific and two-spotted spider mites have been suppressed where schradan has been used to control the walnut aphid, but the compound caused an increase in the population of European red mites. Walnuts can tolerate a relatively large spider mite population, this tolerance allowing sufficient time to determine whether natural enemies will be able to control the pest. Natural enemies reduced spider mite populations below economic levels even where DDT or Sevin were applied. Of the newer acaricides tested, the most effective were Tedion and Kelthane. [For earlier work see *H.A.*, 28: 1317b.]—Univ. Calif., Berkeley.

Insect pests.

(*See also* 1502, 1795, 1930, 2019, 2024, 2025, 2122, 2659, 2759, 3042, 3073, 3078.)

1971. U.S. Department of Agriculture, Entomology Research Division.
Insecticide recommendations of the Entomology Research Division for the control of insects attacking crops and livestock, 1959 season.
Agric. Handb. U.S. Dep. Agric. **120**, revised 1959, pp. 129.

Tables, arranged under crop headings, showing what insecticides to apply and when and how to apply them, for the control of pests of the common vegetables, small fruits, tree fruits, nuts and tobacco.

1972. MADSEN, H. F., AND BARNES, M. M.
Pests of pear in California.
Circ. Calif. agric. Exp. Stat. **478**, 1959, pp. 40, illus.

Appearance, damage caused and control measures for 27 pests.

1973. KESSLER, B., SWIRSKI, E., AND TAHORI, A. S.
Effects of purines upon the nucleic acids and nitrogen metabolism of leaves and their sensitivity to aphids.
Ktavim, 1959, **9**: 265-74, bibl. 14.

Applications of caffeine at 50 and 100 p.p.m. to apple leaves markedly inhibited the development of the green apple aphid (*A. pomi*) on the leaves. Both caffeine and xanthine at 100 p.p.m. gave similar results with *A. craccivora* on beans. Caffeine apparently affects the aphids indirectly through its effect on the metabolism of the host plant, in which it increased the RNA/DNA ratio and the protein fraction and decreased total and soluble N levels. It is effective only when applied to young leaves. [See also *H.A.*, 28: 3530.]—Agric. Res. Stat., Rehovot.

1974. BONNEMAISON, L.
Le puceron cendré du pommier (*Dysaphis plantaginea* Pass.). Morphologie et biologie: méthodes de lutte. **(The grey aphis *(Dysaphis [Sappaphis] plantaginea)* of apple trees. Morphology and biology; control methods.)**
Ann. Épiphyt., 1959, **10**: 257-320, bibl. 3½ pp., illus.

Recent research has supported the removal of this species from the genus *Sappaphis* to *Dysaphis*. Apple varieties which flower late and shed their leaves early are the least susceptible to attack. There is little hope of successful biological control in orchards regularly treated with insecticides, but beneficial ladybirds and hover flies may be attracted by planting winter brassicas in the immediate vicinity. Winter treatments with oil-based insecticides are described. Spring treatments must be applied between the arrival of the first female aphids and oviposition, the most effective insecticides being parathion (in oil or as an aqueous suspension) and Diazinon. Systemic insecticides such as methyl demeton or endothion should not be applied until the leaves are fairly large.—Stat. centr. Zool. agric., Versailles.

1975. EMMEL, L.
Die Wirkung von Thiodan auf die Blutlaus (*Eriosoma lanigerum* Hausm.) und die Blutlauszehrwespe (*Aphelinus mali* Hald.). **(The effect of Thiodan on the woolly aphid and its parasite, *Aphelinus mali.*)**
Anz. Schädlingsk., 1958, **31**: 121-3, illus.

In glasshouse trials Thiodan gave excellent control of woolly aphid on potted apple trees without injuring the parasite *Aphelinus mali.* Even when spraying was carried out at low pressure, so that the wool around the aphids remained intact, the insecticide proved 100% successful.—Farbwerke Hoechst AG.

1976. JONES, S. C.
Systemic insecticides for the control of the black cherry aphid.
J. econ. Ent., 1959, **52**: 778-9, bibl. 1.

In 1954 emulsifiable concentrates of demeton 26·2% and Am. Cyanamid 12008 48% sprayed or painted on the trunks of 3-year-old cherry trees gave complete control of black cherry aphid, *Myzus cerasi.* During 1956 to 1958 on bearing trees pre- or post-blossom sprays of demeton 26·2% and Thimet 48% gave 100% control, though in one trial some infestation occurred when wettable sulphur was added to the demeton. In cherries sampled at harvest no demeton residues were detected.—Ore. St. Coll., Corvallis.

1977. MANOLACHE, C., SUTA, V., AND OANCEA, M.
Contribuţii la biologia şi combaterea gărgăritei florilor de măr (*Anthonomus pomorum* L.) în Republica Populară Romînă. **(A contribution to the biology of apple blossom weevil, *A. pomorum,* and its control in Roumania.)** [Russian and French summaries.]
Bul. ştiinţ. Acad. RPR, Sec. Biol., 1957, **9**(2): 195-209, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 78,310.

Spraying in the middle of April with 0·15% DDT suspension, 0·12% DDT emulsion and 0·5% BHC suspension gave 98·7, 98·5 and 98·2% control, respectively. The average yield of Boiken apples on the DDT plots was 300–400 kg. per tree, compared with 25 kg. on the controls, and of Jonathan 175 kg. and 2–10 kg., respectively.

1978. GUENNELON, G.
Le problème des cétoines grises dans la basse vallée du Rhône. **(The problem of grey chafers in the lower Rhone valley.)**
Ann. Épiphyt., 1959, **10**: 369-406, bibl. 69, illus.

In this region much damage is done to the flowers of pome- and stone-fruit trees by adult *Epicometis hirta*, *E. squalida* and *Oxythyrea funesta.* Although parathion, aldrin, dieldrin and BHC are effective against the pests, their use is precluded because they are highly toxic to bees. Numerous alternative host plants are listed.—Stat. Zool. agric., Montfavet, Vaucluse.

1979. SUMMERS, F. M., DONALDSON, D., AND TOGASHI, S.
Control of peach twig borer on almonds and peaches in California.
J. econ. Ent., 1959, **52**: 637-9, bibl. 3.

ata obtained from initial tests on young, non-earing peach and almond trees, followed by trials n mature peach trees, indicated that sevin and hiodan have good potentialities for the control of each twig borer, *Anarsia lineatella*. Guthion, iazinon, dieldrin, endrin and malathion also owed promise in one or more of the preliminary sts. Two applications of insecticides, one at the nk bud or petal fall stage and the other in late lay, reduced crop infestation on mature peach ees but not sufficiently for adequate commercial ontrol. [See also *H.A.*, 28: 2417.]—Univ. Calif., avis, and Calif. Packing Corp.

980. Gupta, R. L.
A new buprestid pest of peach in Uttar Pradesh and its control.
Sci. and Cult., 1960, **25**: 446, bibl. 1.

fested peach trees appeared unhealthy, with wer branches and leaves than normal, and the rk was badly cracked showing profuse gum udation. The wood was found to be riddled th oval-shaped tunnels containing the grubs. kamination of the grub indicated that it was nilar to a species of *Chrysobothris*. Infestation ay be prevented by wrapping the trunk with per. On trees already infested 3 fortnightly plications of a spray consisting of 3 oz. para-chlorobenzene dissolved in 3 oz. turpentine, to ich 3 oz. of rectified spirit were added, killed % of the larvae in the trunks. Spraying with % formalin was less effective.—Govt. Agric. Coll., anpur.

81. Madsen, H. F., and Bailey, J. B.
Control of *Sanninoidea exitiosa graefi* (Hy. Edw.) on apricots.
J. econ. Ent., 1959, **52**: 804-6, bibl. 10.

ials were conducted on the control of the western ach tree borer on apricots by soil fumigation and nk spraying. In the soil fumigation trials para-chlorobenzene and propylene dichloride gave od results. Tetrachloroethane, while effective, s very phytotoxic. [For control by trunk spraying th Thiodan, endrin, Guthion and DDT, see *A.*, 29: 1305.]—Univ. Calif., Berkeley.

32. Eide, P. M.
Ethylene dibromide for strawberry weevil control.
Down to Earth, 1959, **15**(2): 11-12, illus.

timum dosage was 1 c.c. of 85% EDB per sq. ft., ing 95% control of *Nemocestes incomptus* and *iopithes obscurus*. [See also *H.A.*, 29: 2334.]

33. Whitehead, V. B.
Vine snoutbeetles. The possible reasons for their increase and measures advocated for their control.
Dec. Fruit Gr, 1959, **9**: 274-7, illus.

e spray recommended for control of *Phlyctinus losus* [see *H.A.*, 30: 482] will also control *mnus setulosus* and *E. cerealis*.

1984. Klingler, J.
Ergebnisse von Bekämpfungsversuchen gegen den Gefurchten Dickmaulrüssler, *Otiorrhynchus sulcatus* F. **(Experimental results on the control of the vine weevil.)**
Anz. Schädlingsk., 1958, **31**: 182-5, bibl. 8.

The adult beetle was successfully controlled by all the chlorinated hydrocarbons tested, but phosphoric acid ester preparations proved inadequate. Preliminary observations are recorded on the use of carbon disulphide for the control of the larvae. Aldrin, applied in various forms as a soil insecticide, also gave promising results against the latter.—Eidg. Versuchsanst., Wädenswil.

1985. Bardía Bardía, R.
El "diabló" (*Balaninus nucum* L.) del avellano en Cataluña. **(The hazel nut "devil" *(Balaninus nucum)* in Catalonia.)**
Rev. Inst. agric. catal., 1959, **108**: 122-5, 135-9, illus.

Part 1 gives the history and biology of the pest. Part 2 lists susceptible varieties of the nut and describes methods of control, including winter cultivation of the soil, the use of ants' nests (not recommended), baiting with halves of oranges treated with sodium arsenate, and spraying with various arsenates or with chlorinated or organic phosphorus insecticides. Soil treatments with BHC or aldrin are also described.

1986. Baas, J.
The Mediterranean fruit fly *Ceratitis capitata* Wied. in Central Europe (Part 2).
Höfchen Briefe, 1959, **12**: 113-40, bibl. 65.

A review. [For part 1 see *H.A.*, 25: 2734a.]

1987. De Pietri-Tonelli, P.
Lotta contro la mosca delle frutta. **(Fruit fly control.)**
Inf. fitopat., 1959, **9**: 362-3, illus.

A single application of Rogor (0,0-dimethyldithiophosphorylacetic N-monomethylamide) at 0·03% for apricot trees and at 0·05% for peach trees, when the fruit was beginning to change from green to yellow, gave good control of *Ceratitis capitata*. If ripening or harvesting should be unduly prolonged, this application could be reduced to half the concentration, and a second similar treatment given 10 days later. Thorough surface coverage is essential, because, although Rogor readily penetrates into the fruit, it fails to spread superficially. Ripe fruits contained residues of 0·4–0·5 p.p.m. of the insecticide, i.e. below the tolerance limit.

1988. Myburgh, A. C.
Bait sprays for fruit fly control.
Dec. Fruit Gr, 1959, **9**: 235-6, illus.

A soluble protein derived from local pilchard fish has proved an effective and cheap attractant. The recommended bait spray is 3 lb. malathion

25% w.p., plus either 75 lb. sugar or 6 lb. fish protein in 100 gal. [See also abstract 2759.]

1989. Bot, J.
Control fruit fly now.
Fmg S. Afr., 1959, **35**(9): 12-13, illus.

Ceratitis capitata and *C. rosa* can be controlled by spraying with either 2 oz. 50% malathion w.p. or $\frac{3}{4}$ oz. 50% Dipterex w.p. plus 3 lb. sugar in 4 gal. twice weekly from 6 weeks before until 3 weeks after harvesting. An alternative spray for larger areas comprises 6 lb. of dried soluble fish protein, plus either 2 lb. 25% malathion w.p. or 1 lb. 50% Dipterex w.p. in 100 gal. applied as above. Fruit which has been stung and fallen fruit should be regularly collected and placed for 48 hours in tins full of water topped up with paraffin.

1990. Oatman, E. R.
Apple maggot control studies with soil insecticides.
J. econ. Ent., 1959, **52**: 751-2, bibl. 4, illus.

Four compounds were applied to the soil at 5·3 lb. of toxicant per acre for the control of the soil-inhabiting stages of apple maggot, *Rhagoletis pomonella*. Endrin was the most effective, giving a 96% reduction of adult emergence over the control. Dieldrin, aldrin and heptachlor were less satisfactory, giving reductions of 66, 63 and 60%, respectively.—Univ. Wis., Madison.

1991. MacCollom, G. B.
Apple maggot, orchard enemy.
Vt Fm Home Sci., 1959, **5**(1): 12-13, illus.

Rhagoletis pomonella well controlled by Guthion and Sevin sprays applied from the ground and by Sevin dust applied from the air.

1992. Frick, K. E.
Further comparative toxicity tests against the western cherry fruit fly.
J. econ. Ent., 1959, **52**: 769-70, bibl. 2.

From results of a laboratory test with 4 insecticides against *Rhagoletis cingulata indifferens*, Dibrom would appear to be useful for spraying just before or during harvest. In another test Trithion showed promise. In field trials parathion proved far superior to Korlan at equal dosages. [For earlier work see *H.A.*, 28: 307.]—Irrigation Exp. Stat., Prosser, Wash.

1993. Dorst, H. E.
Field control of *Drosophila* spp. in cull fruit.
J. econ. Ent., 1959, **52**: 755, bibl. 3.

In piles of cull peaches and pears a single application of each of the following 4 granular insecticides at $\frac{1}{2}$ lb. per 10 bushels of fruit gave 95–99% control of *Drosophila* for 28 days: 2·5% endrin, 5% lindane, 15% malathion and 2·5% Diazinon. [See also *H.A.*, 30: 485.]—Agric. Res. Serv., U.S.D.A., and Utah and Colo. agric. Exp. Stats.

1994. Michelbacher, A. E., and Wasbauer, M.
Walnut serpentine leaf miner, *Nepticula juglandifoliella* Clem., a pest of English walnut.
J. econ. Ent., 1959, **52**: 690-2, bibl. 2, illus.

Serious damage to walnuts by the walnut serpentine leaf miner is reported for the first time from California. It is believed that under ordinary conditions the pest is held in check by natural enemies, and that treatments of demeton applied to control the walnut aphid may have interfered with effective parasitism. Parasites were very abundant and the following species were reared from infested leaves: *Closterocerus utahensis californicus*, *Zagrammosoma nigrolineatum* and *Solenotus begini*. [From authors' abstract.]—Univ. Calif., Berkeley.

1995. Todd, D. H.
The apple leaf-curling midge, *Dasyneura mali* Kieffer, seasonal history, varietal susceptibility and parasitism 1955-58.
N.Z. J. agric. Res., 1959, **2**: 859-69, bibl. 3.

Of the 5 generations of these midges occurring in a normal year, the 2nd and 3rd do the most damage. They show no varietal preference, but varieties with the least terminal growth during the period of greatest infestation suffer the least injury. The life cycle of the parasite *Prosactogaster demades* is not fully synchronized with that of the host, and so the parasite fails to achieve adequate control of the critical 2nd generation. Chemical control at this period is recommended.—D.S.I.R., Palmerston North.

1996. Coutin, R.
Étude expérimentale sur les captures d'imagos de *Laspeyresia pomonella* L. par des pots-pièges-appats. **(An experimental study on captures of adult codling moths by baited pot traps.)**
Ann. Épiphyt., 1959, **10**: 351-67, bibl. 22, illus.

Baited pot traps alone did not give an accurate picture of the degree of infestation of apple orchards.

1997. Morris, D. S., and Van Baer, R.
DDT-resistant codling moth in Victoria. Laboratory and field investigations with insecticides.
J. Agric. Vict., 1959, **57**: 619-23, 684-7, bibl. 9, illus.

For the control of DDT-resistant codling moths 0·05% Gusathion or 0·1% Sevin is recommended, applied at 3-week intervals from the last week in October until the end of December; these preparations also control the light brown apple moth. Satisfactory control was also obtained with malathion, parathion, Diazinon, Dipterex and Trithion.

1998. MYBURGH, A. C.
New insecticides against codling moth.
Dec. Fruit Gr, 1959, **9**: 240-1.

Gusathion and Sevin sprays at 1 lb. w.p. per 100 gal. applied every 14–21 days have given good control of codling moth and also of leaf rollers. Gusathion should not be applied within 3 weeks and Sevin within 1 week of harvesting. [See also *H.A.*, 29: 311w.]

1999. HIGGONS, D. J.
New insecticide gives encouraging control of codling moth.
Comm. Gr, 1959, No. 3338, p. 1132.

Sevin, at concentrations from 0·025% to 0·1%, was sprayed in several apple and pear orchards, the results being compared with the effect of 0·1% DDT. In all trials, control of codling moth by Sevin was outstanding, showing an improvement of up to 300% over DDT. No damage to leaves or fruit was reported. Sevin was comparable to DDT in its stimulation of red spider mite populations.

2000. THOMAS, H. A., SPECHT, H. B., AND DRIGGERS, B. F.
Arthropod fauna found during the first-season trial of a selective spray schedule in a New Jersey apple orchard.
J. econ. Ent., 1959, **52**: 819-20, bibl. 6.

The data presented indicate that a glyodin-ryania schedule can provide acceptable codling moth control on apples, accompanied by satisfactory control of phytophagous mites. [From authors' abstract.]—Rutgers Univ., New Brunswick, N.J.

2001. V. ROSENBERG, —.
Report on the application of different insecticides for the first pre-blossom spraying and the use of oleo-phosphoric esters for the second pre-blossom spraying, 1958.
Höfchen-Briefe, 1959, **12**: 20-2.

Folidol oil spray (an oleo-phosphoric ester) was better than either lindane plus DDT or E 605 forte when applied in mid-April (1958) for control of a severe codling moth infestation. Lindane plus DDT was unsatisfactory for codling moth control, but all 3 sprays controlled a weakened population of green apple aphid. A second application of 2 oleo-phosphoric ester products, given at green cluster, killed all codling moths in cocoons.

2002. MACLELLAN, C. R.
Woodpeckers as predators of the codling moth in Nova Scotia.
Canad. Ent., 1959, **91**: 673-80, bibl. 7.

Analyses showed that woodpeckers were efficient predators of overwintering codling-moth larvae and exhibited intraspecific competition. Woodpeckers frequently reduced the pest population in orchards to a level where other natural control agents were able to prevent the succeeding generation from damaging the fruit to an uneconomical degree. The numbers of woodpeckers, which never exceeded 4 per location, were estimated in 33 orchards for the years 1954–58. Two methods of study, sight records and observation on signs of feeding activity, showed that these birds live in permanent feeding zones which vary in size according to the food available. In areas that undergo little or no physical change the numbers of woodpeckers may remain steady for several years. [Author's summary. For an earlier report see *H.A.*, 28: 2421.]—Kentville Res. Stat., Nova Scotia.

2003. BOLZANI, P., CANEVASCINI, V., AND BAGGIOLINI, M.
Esperimenti di lotta contro la tignola orientale del pesco (*Laspeyresia molesta* Busck), effettuati nei pescheti ticinesi dal 1953 al 1958. (**Experiments on control of oriental peach moth (*Laspeyresia molesta*) in Italian Switzerland from 1953 to 1958.**)
[English, French and German summaries, ½ p. each.]
Landw. Jb. Schweiz, 1959, **8**: 621-44, bibl. 12, illus.

As a result of a series of experiments, Diazinon is the only insecticide recommended for control of the oriental fruit moth on peaches. For complete protection in cases of heavy infestation, 5–6 sprays are necessary during the period June–August.—Serv. canton. Fruttic., Bellinzona, and Stat. féd. Ess. agric., Lausanne.

2004. BAGGIOLINI, M., HÜGI, H., AND NEURY, G.
Considérations sur la lutte contre l'hyponomeute du pommier et du prunier. (**Observations on control of the ermine moth of apple and plum trees.**)
Rev. romande Agric. Vitic., 1960, **16**: 3-6, bibl. 5, illus.

Recommendations for controlling *Hyponomeuta malinella* and *H. padella*.

2005. JANSSEN, M.
Tortriciden in rheinischen Obstanlagen. (**Tortricids in orchards of the Rhine region.**)
[English summary 5 lines.]
Anz. Schädlingsk., 1959, **32**: 6-8, bibl. 30, illus.

Including an identification key for caterpillars of 9 species of *Argyroploce*, *Adoxophyes*, *Pandemis* and *Cacoecia*.

2006. AUERSCH, O.
Zum Auftreten des Apfelschalenwicklers (*Adoxophyes reticulana* Hb.) 1958 im Gebiet von Halle/S. (**The incidence of *Adoxophyes reticulana* in the area of Halle/Saale in 1958.**)
Anz. Schädlingsk., 1959, **32**: 53-7, bibl. 3, illus.

In recent years *Adoxophyes reticulana* has become a major apple pest in Germany. Observations on its incidence, the injuries it causes and its control in the area of Halle/Saale are recorded, including an attack on pears. Contact insecticides applied in spring after the emergence of the first caterpillars have been found promising. Late winter spraying with dinitrocresol is also recommended.—Martin-Luther-Univ., Halle.

2007. South Australia, Department of Agriculture.
Some facts about light brown apple moth.
J. Agric. S. Aust., 1959, **63**: 68-9, illus.

Tortrix postvittana and its control with TDE (DDD) on apples, pears, apricots, peaches, citrus and grape vines.

Other pests.

2008. Wright, E. N.
Bird damage to horticultural crops.
J. roy. hort. Soc., 1959, **84**: 426-34, bibl. 9.

Examples of damage and possible methods of prevention using netting, polythene, scarecrows and repellents.

2009. N—, A.
Danni da passeri ai bottoni fiorali del melo. **(Damage to apple flower buds by sparrows.)**
Tecn. agric., 1959, **11**: 261-5, illus.

Shooting and trapping give better results than traditional methods or detonators.

2010. Peutz, H. R. J. J.
Ervaringen bij spreeuwenafweer met behulp van een geluidsband. **(Experiments on the use of a tape recorder for protection against starlings.)**
Fruitteelt, 1960, **50**: 74.

In several experiments in the Northeast Polder, an endless tape recording of the alarm call of a starling has been successfully used to scare flocks of starlings intending to settle in orchards. The loudspeaker was placed in the middle of the orchard. The recording must be intermittent, and must be used from sunrise until sunset. It is advisable to supplement the tape recording with other forms of scarer, such as bangers.

2011. Kerkhof, J. G.
Bestrijdt de spreeuwen. **(Control the starlings.)**
Fruitteelt, 1959, **49**: 1018, illus.

An amateur fruit grower has prevented birds from settling in his garden for 2 years by the use of plastic flags. Three strands of wire were stretched between 2 end posts 2½ m. high and about 9 m. apart, and plastic flags 1 m. square were fastened to string stretched vertically between the wires. The flapping and noise made by the flags scared birds both on the ground and in flight.

2012. Pfeifer, S., and Keil, W.
Zum Verhalten von Staren (*Sturnus vulgaris*) beim Überfliegen ihrer Schlafplätze durch Hubschrauber. **(On the behaviour of starlings in response to helicopters flying over their sleeping quarters.)** [English summary 3 lines.]
Z. PflKrankh., 1960, **67**: 87-90, bibl. 12, illus.

Starlings were permanently driven out of their sleeping quarters in extensive reed beds, in the neighbourhood of cherry orchards, by helicopters equipped with flash lights flying over the area on 3 evenings at dusk.

2013. Weca.
Kunststof tegen wildschade. **(A synthetic material for protection against animal pests.)**
Fruitteelt, 1959, **49**: 1037, illus.

A perforated plastic sheath, made in the form of a spiral, is available for wrapping around the trunks of young fruit trees to protect them against rabbit and hare damage.

2014. Bernard, J.
À propos de la lutte contre les rongeurs par pulvérisation d'"insecticide" sur le sol. **(Concerning rodent control by spraying insecticide on the soil.)**
Rev. Agric. Brux., 1959, **12**: 583-94, bibl. 38.

A review, from which it is concluded that the disadvantages outweigh the advantages [see also *H.A.*, 29: 2354].

2015. Stenmark, A., and von Rosen, H.
Bekämpningsförsök mot vattensork och åkersork. **(Experiments on the control of water and field voles.)**
Växtskyddsnotiser, 1959, **23**: 24-33, illus.

Area baiting preferable to spraying with endrin or toxaphene.

Chemicals and their application.

(*See also* 1571, 1580, 1703, 1789, 1962, 3016.)

2016. Chamberlain, E. E., and Atkinson, J. D.
Certification of therapeutants and plant hormones.
Inf. Ser. D.S.I.R., N.Z. **13**, 4th edition, 1959, pp. 18.

A revised list [see *H.A.*, 28: 2448i] of 119 substances.

2017. Cation, D.
Some fungicide trials on tree fruits in 1958.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 685-98, bibl. 5

Results are given of tests with 24 fungicides or fungicide mixtures in 1958. *Apples:* Phybam S (75% wettable S, 18% ferbam and 6% Phygon) and a ferbam-sulphur-Glyodin combination gave best control of powdery mildew, but the latter spray caused severe russeting in Jonathan apples. Cyprex sprays caused serious russeting on the ariety Stayman. *Sweet cherries:* Cracking was ncreased by the use of Cyprex and Glyodin sprays. Copper-sulphur-lime, sulphur-Glyodin, ferbam-ulphur and captan sprays were effective in retarding all rots. Thylate, ferbam-sulphur-Glyodin and ctidione-Glyodin gave control of brown rot. See also *H.A.*, 29: 2302.] *Pears:* Glyodin-Phix, anogen and Cyprex appeared promising as egards fruit finish. *Peaches:* Sulphur and Phaltan ave good control of fruit rots. *Sour cherries:* haltan, Upjohn U9547 and Cyprex gave good leafpot control.

018. GARMAN, P.
Experiments in apple insect control.
J. econ. Ent., 1959, **52**: 826-8.

leven combinations of insecticides and fungiides were applied to McIntosh apples in Conecticut for control of insects and diseases in 1957 nd 1958. When these were rated on the basis of st control, quality of fruit, safety and cost, the der of preference was (1) Guthion-captan,) Sevin-Kelthane-captan, (3) methyoxychloryodin-ferbam, and (4) lead arsenate-malathionptan. Kepone-captan, used only in 1958, gave ry promising results. The possible place of ese and other pesticides in apple insect control is scussed. [From author's abstract.]—Conn. ric. Exp. Stat., New Haven.

19. HOUGH, W. S., GROVES, A. B., AND HILL, C. H.
Effects of some spray mixtures on toxicity of DDT, parathion, and malathion.
Tech. Bull. Va agric. Exp. Stat. **143**, 1959, pp. 26, bibl. 27, illus.

everal insecticides, acaricides and fungicides were plied in mixtures with DDT, parathion and alathion, and the effect on their initial and resial toxicity to codling moth larvae was studied in chard and laboratory. The most important ctors that appeared to influence results of the xicity tests were temperature, fruit growth and ray deposit variations.

20. COX, J. A., AND FLEMING, H. K.
Effects of certain sprays on growth and yield of Concord grapes.
Bull. Pa agric. Exp. Stat. **652**, 1959, pp. 18, bibl. 5, illus.

periments to determine the effects on growth and ld of Concord grapes from spray programmes of DT, bordeaux mixture, low soluble copper, ptan and ferbam were conducted on "balanced uned" vines. Fertilizer and cultural programmes re uniform for the treatments in two vineyards. sponse to spray treatments was first apparent growth of vine, and differences in fruit yield one ar later. Sprays of bordeaux mixture and DDT-rdeaux mixture reduced both growth and yield. certain seasons sprays of DDT-low soluble copper and lime were depressing, but sprays of DDT, DDT-captan, and DDT-ferbam had little or no effect on the growth of the vines. None of the treatments stimulated growth or increased yields. Insects and diseases caused little or no economic losses in the experimental vineyards. Each year copper injury was apparent on vines treated with bordeaux mixture but was more pronounced during cool wet summers. [Authors' summary.]

2021. BENDER, E.
On the use of Folidol oil for bud-burst spraying.
Höfchen-Briefe, 1959, **12**: 17-20.

Trials in commercial pome fruit orchards have shown that a better insecticidal effect is obtained by the inclusion of an oleo-phosphoric ester in the first pre-blossom scab spray than by parathion in this spray.—Crop Prot. Field Stat., Meersburg.

2022. FURMIDGE, C. G. L.
Physico-chemical studies on agricultural sprays. III. Variation of phytotoxicity with the chemical structure of surface-active agents.
J. Sci. Food Agric., 1959, **10**: 419-25, bibl. 6.

The phytotoxicity and wetting ability of 61 surface-active agents of known chemical structure have been tested on the leaves of two varieties of apple and two of plum. All non-ionic materials cause little damage on apple and plum leaves; anionic and cationic materials cause variable damage depending on their chemical structure and on the nature of the leaf surface. In any homologous series of surface-active agents the phytotoxicity appears to pass through a maximum as the molecular size is progressively increased. Since this maximum usually occurs at fairly short alkyl chain lengths (dodecyl or below), for most practical purposes phytotoxicity decreases as the size of the alkyl group increases. [From author's abstract. For Parts I and II, see *H.A.*, 29: 3477.]—Long Ashton Res. Stat., Bristol.

2023. DORMAL, S., AND MARTENS, P. H.
Étude de la persistance de résidus d'insecticides dans les cerises et les pêches. **(A study of the persistence of insecticide residues in cherries and peaches.)**
Rev. Agric. Brux., 1959, **12**: 573-81, bibl. 3.

When 4 phosphoric esters (parathion, Chlorthion, Isochlorthion and Dipterex) and DDT were sprayed on cherry and peach trees of several varieties as emulsions, the phosphoric esters (1) persisted for a much shorter time (13–18 days on cherry) than did DDT (many weeks), (2) penetrated the epidermis of cherries almost completely in 3 hours of exposure to the sun, (3) scarcely penetrated into the pulp of peaches. [For similar work on vegetables see *H.A.*, 30: 610.]—Centr. Rech. Phytopharm., Gembloux.

2024. Hunnam, D., and Dash, C. R.
Aerial spraying does not give full protection.
Grower, 1960, **53**: 24-6, illus.

Preliminary trials over 2 seasons were carried out in apple orchards in Kent and Hertfordshire to compare aerial spraying, using fixed-wing aircraft and a helicopter, with ground spraying for control of the major pests and diseases. Captan and Karathane were used against scab and mildew; malathion and Rogor against aphids; Rogor, malathion or Phenatol against red spider; and DDT against tortrix and codling moth. Aerial spraying was shown to be inadequate for control of mildew and woolly aphids with the materials used. Results for scab, tortrix, codling and sawfly were inconclusive. Against red spider mites the systemic material Rogor was more effective than malathion, owing to variation in deposit with aerial spraying. It is suggested that the general use of systemics may be necessary if aerial spraying is to be successful in orchards. [For an earlier report see *H.A.*, 29: 2363.]—Murphy Chem. Co., Wheathampstead.

2025. Myburgh, A. C., and Rust, D. J.
How to apply fruit fly bait.
Dec. Fruit Gr, 1959, **9**: 302-4, illus.

Manual and powered spraying equipment briefly described.

2026. Johansen, C.
Bee poisoning. A hazard of applying agricultural chemicals.
Stats Circ. Wash. St. agric. Exp. Stats **356**, 1959, pp. 5.

Including a list of 60 modern insecticides showing their toxicity to bees as dusts and as sprays.

2027. Sanger, A. M. H.
Aldrin, dieldrin and endrin toxicity to bees.
Span, 1959, **2**: 59-63, bibl. 22.

A review, giving data on the toxicity of numerous modern insecticides to bees.

2028. Beran, F.
Anwendung von Pflanzenschutzmitteln und Bienenschutz. (**The toxicity to bees of plant protection chemicals.**)
Anz. Schädlingsk., 1958, **31**: 97-101, bibl. 21.

A review [see also *H.A.*, 30: 519].

2029. Beye, F., Kaeser, W., and Buchner, R.
Zur Wirkung von Aktivsubstanzen verschiedener Insektizide auf Bienen. (**The effect of the active ingredients of several insecticides on bees.**)
Anz. Schädlingsk., 1959, **32**: 41-3, 121-3, bibl. 4.

Tabulated results obtained with 9 insecticides.

WEEDS AND WEED CONTROL.

General.

(*See also* 1554-1556, 1570, 2208, 3039, 3041.)

2030. Sweden, Royal School of Agriculture.
Undersökningar rörande ogräsproblem 1952-1958. (**Investigations on weed problems 1952-1958.**) [English summaries.]
Växtodling, 1959, No. 10, pp. 244, bibls, illus.

This entire issue is occupied by papers on weed control, with an introduction on the work done during the period at the Institution for Plant Husbandry, and a final summary. Pea crops were included in some of the experiments, which showed that at a density exceeding 200 plants per sq. m. the crop allowed few if any plants of *Chenopodium album* or *Sinapis arvensis* to develop, and was only lightly infested by wild oats (*Avena fatua*), but that fertilizing with N benefited *C. album* at the expense of the peas. Aspects of wild oat control are dealt with in 5 papers, and other weeds claiming separate attention are species of wild onion, goosegrass (*Galium aparine*), dandelions, hedge bedstraw (*G. mollugo*) and yellow rattle (*Rhinanthus serotinus*). The remaining papers deal with various herbicides, singly or in groups.

2031. Serna Echeverri, H.
Control de malezas en areas no cultivadas. (**Weed control in areas not under cultivation.**)
Agric. trop. Bogotá, 1959, **15**: 436-45, illus.

Woody and herbaceous weeds, including water hyacinth, with reference to roads, railways, etc.

2032. Idrobo M., E. A.
Represión de malezas en zanjas y canales de riego mediante herbicidas. (**Weed control in irrigation furrows and channels by means of herbicides.**) [English summary ½ p.]
Acta agron. Palmira, 1958, **8**: 181-96, bibl. 11.

The predominant weeds were the grasses *Panicum purpurascens* and *Cynodon dactylon*, nutgrass (*Cyperus rotundus*), and the dicotyledons *Amaranthus dubius*, *Bidens pilosa*, *Portulaca oleracea*, *Solanum nigrum*, *Tagetes* sp. and *Senecio* sp. From a number of treatments, 2 which gave good control in either the dry or the rainy season were: (1) a mixture of 2,4,5-T and TCA at either 15 and 25 or 35 and 50 kg./ha.; (2) CMU at 45 kg. + 2,4,5-T at 30 kg./ha. Alternative treatments for the rainy season were: CMU alone at 50-70 kg./ha. or in mixture with TCA both at 40 kg./ha. The effects of the treatments on the weeds 4 and 8 weeks after application are recorded.

2033. Havis, J. R., Ticknor, R. L., and Bobula, P. F.
Influence of soil moisture on the activity of EPTC, CDEC and IPC.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 52-6, bibl. 7.

EPTC failed to control weeds when applied to wet soil, and CDEC was more effective when applied to dry soil than to wet. Both gave better weed control on dry soil when incorporated into the soil and when irrigation followed application. CIPC was little affected by soil moisture and incorporation into the soil reduced its effectiveness.—Univ. Waltham, Mass.—*Weed Abstr.*, **8**, No. 1939.

2034. Juniper, B. E.
The effect of pre-emergent treatment of peas with trichloracetic acid on the submicroscopic structure of the leaf surface.
New Phytol., 1959, **58**: 1-4, bibl. 5, illus.

Increased concentrations of TCA in the soil caused reductions in the number, and a change in the form, of the minute wax structures on the leaf surface, with a resulting increase in wettability as shown by changes in the contact angle of water droplets.—Oxford Univ.

Specific weeds.

(*See also* 1492, 1506, 2030, 2057, 2059, 2060, 2063, 2099, 2437.)

2035. Borsa, P.
Risultati di prove decespuglianti su robinia, rovo, evonimo, olmo e fitolacca. (**Results of brush clearance experiments on *Robinia*, bramble, spindle, elm and *Phytolacca*.**)
Not. Mal. Piante, 1958, No. 45/46, pp. 21-30.

Optimal application rates of 2,4,5-T and of a mixture of this with 2,4-D are given for destruction of *Robinia pseud-acacia*, blackberries (*Rubus caesius* and *R. ulmifolius*), spindle (*Euonymus europaeus*), *Phytolacca decandra*, elm (*Ulmus carpinifolia* var. *suberosa*), and plane (*Platanus orientalis*).

2036. Phillips, W. M.
New chemicals to control field bindweed.
Bull. Kans. agric. Exp. Stat. **408**, 1959, pp. 6, illus.

TBA (trichlorobenzoic acid) and PBA (polychlorobenzoic acid), at rates necessary to control bindweed, sterilize the soil and prevent crop production for 1 year or longer.

2037. Conway, E.
The bracken problem.
Outlook on Agric., 1959, **2**: 158-67, bibl. 18, illus.

A review of work on its eradication.

2038. Pirie, N. W.
Water hyacinth: a curse or a crop?
Nature, 1960, **185**: 116, bibl. 10.

A suggestion that *Eichhornia crassipes* might be exploited economically as a source of extracted protein.

Weed control in temperate fruit crops.

(*See also* 1839, 3047, 3048, 3051.)

2039. Quaglia, A.
Il disherbo chimico dei frutteti. (**Chemical weed control in orchards.**)
Inf. fitopat., 1959, **9**: 282-3.

Recommendations are made for the dosage and conditions of use of ATA, DPA and CIPC in apple and pear orchards, ATA in plum orchards and CIPC in cherry orchards. The use of ATA in peach orchards is scarcely beyond the experimental stage. Herbicides recommended for vineyards are ATA, monuron, DPA, and CIPC, and for citrus groves ATA. Diuron and simazine are advised for winter use in orchards and vineyards.

2040. Schubert, O. E.
Effect of recommended and excessive rates of certain herbicides to apple trees of varying ages.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 62-3.

The following in 100 gal. spray were applied to Double Red Delicious replants, to young Red Rome and Golden Delicious, and to mature Red Stayman apple trees, at 200 gal./ac. for the basic rate (X) and at 1,000 gal./ac. to obtain a five-fold application (5X): amitrol at 2 lb., AMS at 75 lb., 2,4,5-T (ester and amine), 2,4,5-TP, dinoseb (amine) + dalapon at 4·25 lb. and dinoseb 55% at 3 pt. + 20 gal. fuel oil + 80 gal. water. AMS was the only compound to cause toxic symptoms. These, in the form of small chlorotic spots, were observed 1 year later on the young replant Golden Delicious from both X and 5X concentrations, and on young Golden Delicious and mature Red Stayman from 5X.—Agric. Exp. Stat., Morgantown, W. Va.—*Weed Abstr.*, **8**, No. 1851.

2041. Schubert, O. E.
Comparison of five herbicides used to kill established poison ivy in a mature apple orchard.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 57-9.

The outstanding herbicide in this trial was amitrol at 2 lb./100 gal., which one year after application had virtually eliminated the poison ivy (*Rhus radicans*). AMS at 75 lb./100 gal. also gave excellent control. Good average results, but with considerable variation, were shown by 2,4,5-T ester, 2,4,5-T amine and 2,4,5-TP, all at 2 quarts/100 gal. The volume for all 5 treatments was 200 gal./ac.—Agric. Exp. Stat., Morgantown, W. Va.—From *Weed Abstr.*, **8**, No. 1885.

2042. Meggitt, W. F., and Aldrich, R. J.
Amitrol for control of redroot in cranberries.
Weeds, N. York, 1959, **7**: 271-6, bibl. 5, illus.

The only one of 7 herbicides to show promise of controlling *Lachnanthes tinctoria* [see also *H.A.*, 28: 3583].

2043. Dana, M. N.
Effect of amitrol sprays on the growth and development of the cranberry.
Weeds, N. York, 1959, 7: 277-83, bibl. 7.

Amitrol at 1–4 lb./ac. was applied to mature cranberries, variety Searle, on 5 dates at the following stages of development: white bud, buds out ¼ in., pink hook, late full bloom and first fruit buds forming. None of the applications had any significant effect on yield, fruit size, fruit set, growth or percentage of uprights with terminal flower buds. The 4 lb./ac. rate applied at the pink hook stage, however, tended to reduce yields. The commonest weeds in Wisconsin cranberry bogs are listed.—Univ. Madison, Wisconsin.—*Weed Abstr.*, **8**, No. 1847.

2044. Chappell, W. E., and Bower, F. L.
Granular and spray applications of certain herbicides in strawberries and raspberries.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 64-8.

Neburon at 6 lb./ac. applied on vermiculite to Blakemore strawberries 1 month after planting in the spring gave good weed control for at least 2 months without crop injury; when applied as a spray plant vigour was seriously affected. 2,4-DES at 3 lb./ac. applied as a spray and on vermiculite caused no injury but gave less effective and less lasting weed control. When applied undirected to new growth on red raspberries immediately following cultivation on May 13, granular formulations of dinoseb at 7·5 and 9 lb./ac., EPTC at 7·5 and 10 lb./ac., neburon at 6 lb./ac., and simazine at 2 lb./ac. caused no loss of crop vigour, though neburon and dinoseb caused temporary foliage burn. Simazine, neburon and dinoseb at 9 lb./ac. gave satisfactory weed control for about 6 weeks. When applied in both granular and spray formulations to the base of black raspberries in May, EPTC at 6 lb./ac., neburon at 5 lb./ac., simazine at 3 lb./ac., and dinoseb (granular) at 12 lb./ac. and (spray) at 33 ml./l. in 3 qt. oil and 13 gal. water/100 sq. ft. caused no apparent injury. Dinoseb gave satisfactory weed control for 3 weeks and simazine and neburon for 6 weeks. —Agric. Exp. Stat., Blacksburg, Va.—*Weed Abstr.*, **8**, No. 1852.

2045. Zanardi, D.
Ancora sul diserbo dei vigneti con ATA ed ureici. (**A further note on the use of ATA and herbicides derived from urea in the vineyard.**) [English summary 10 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 8-13, bibl. 14, illus.

In an uncultivated vineyard covered with a thick grass layer, ATA (amitrol) at both 4 and 6 kg./ha. proved more effective than monuron, diuron and particularly neburon at similar concentrations. The vines were uninjured.

2046. Branas, J.
Les substances télétoxiques. (**Teletoxic substances.**)
Progr. agric. vitic., 1959, **152**: 117-23, 147-53, 171-7, and 1960, **153**: 5-10, illus.

The toxic effects of synthetic growth substances and their practical applications, including weed control, in viticulture are discussed.

Weed control in ornamentals.

(*See also* 1556, 2630, 3049.)

2047. Bing, A.
Aspects of some herbicides on nursery stock.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 407-12.

The tolerance of 20 ornamental species and the susceptibility of 6 weed species to 12 herbicides, some in both spray and granulated forms, during a 1-year trial are given. Diuron granular, though possibly harmful to *Ilex crenata convexa*, showed great promise in nursery stock, but as a spray it was injurious. Atrazine was promising against *Cyperus esculentus*, although toxic to some ornamentals.—Cornell Ornamentals Res. Lab., Long Island.—From *Weed Abstr.*, **8**, No. 1840.

2048. Bing, A.
Two year tests with diuron and chloro IPC on nursery stock.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 401-2.

The reaction of 10 species of woody ornamentals in the nursery to 2 annual applications of liquid and granular CIPC and diuron is shown.—Cornell Ornamentals Res. Lab., Long Island.—From *Weed Abstr.*, **8**, No. 1841.

2049. Ticknor, R. L., Havis, J. R., and Bobula, P. F.
Pre- and post-planting treatments for weed control in nursery lining-out stock.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 390-6, bibl. 1.

Methyl bromide (MeBr) at 1 lb./100 sq. ft. was applied under a plastic cover, DMTT at 0·675 lb./100 sq. ft. was rototilled to a depth of 5 in., SMDC at 1 quart/100 sq. ft. was watered into the soil, and EPTC at 10 and 20 lb./ac. on a granular carrier was applied to dry soil and rototilled to a depth of 5 in. Ten days later *Euonymus patens*, *Rhododendron yedocuse ponkhanense*, *Taxus media browni*, *Thuja occidentalis*, and (except in the EPTC plots) *Viburnum juddi* were planted, and the next day post-planting treatments with (1) 2 in. of bark mulch, (2) 2 in. sugar cane bagasse mulch, and (3) CIPC 5% granular at 8 lb./ac. were applied to all plots. MeBr gave better weed control than ther DMTT or SMDC and also resulted in nproved plant survival and growth. DMTT and MDC both reduced plant survival and evidently quired a longer interval before planting. EPTC 10 and 20 lb./ac. gave complete weed control n all plots for over 3 months; 20 lb./ac. caused lant growth inhibition but no casualties, but rowth from 10 lb./ac. was equal to the control. ugar cane bagasse was the most effective of the ost-planting treatments. A pilot trial indicated at EPTC was less effective on moist soil.—Univ. assachusetts, Waltham.—*Weed Abstr.*, **8**, No. 43.

50. PRIDHAM, A. M. S.
Granular Mylone—a pre-planting measure for control of perennial weeds of nursery and ornamental plantings.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 384-9.

veral trials are reported, in which DMTT ylone) was applied to different soils at soil mperatures of 35–60° F. The results indicated at the best results are obtained with 150–300 /ac. applied under a cover, and where the soil mperature is not below 45° F. *Artemisia vulgaris* s drastically reduced by 150–300 lb./ac. roto- ed into the soil. An interval of 2 weeks before nting is advised, if, during 1 week of the 2, the l is exposed to the air and not subjected to avy rain or watering. *Vinca minor*, *Pachysandra minalis*, *Euonymus* and roses showed signs of ury when planted 7 days after treatment. tted plants showed rapid establishment when nted in DMTT-treated soil.—Cornell Univ., aca, N.Y.—From *Weed Abstr.*, **8**, No. 1844.

51. PRIDHAM, A. M. S.
Evaluation of simazin in the control of seedling and established perennial weeds in nursery and ornamental plantings.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 403-6.

r the response of 12 weed species to simazine and ne other herbicides, see *Weed Abstr.*, **8**, No. 8.

52. (MAHLSTEDE, J. P.)
Test herbicide use with nursery stock.
Ia Fm Sci., 1959, **14**: 375, illus.

pot experiments with crab apple and forsythia AA and sesone applied separately or together a rate of 8 lb./acre gave complete control of eat growing as a weed in the same pot for a eek period without damage to the ornamentals. ese substances gave only 50% control of lima ns growing as weeds after 3 weeks. Simazine b./acre) and monuron satisfactorily controlled eat and beans growing among redbud and honey- kle plants, causing only slight leaf damage. Amino-triazole did not control the weeds satisfactorily.

2053. AHRENS, J. F.
Chemical weed control in evergreen nurseries.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 397-400.

For results of 2 experiments see *Weed Abstr.*, **8**, No. 1842.

2054. KNEIPP, O., AND ZIMMER, K.
Die Unkrautbekämpfung in Erikenbeeten. I. Erfahrungen aus Frankfurt. II. Erfahrungen aus Hannover. **(Weed control in erica beds. Trials at Frankfurt and Hanover.)**
Gartenwelt, 1959, **59**: 439-40, illus.

Preliminary trials at Frankfurt demonstrated the feasibility of using weak solutions as follows, viz. 0·1 g./m^2 simazine, 0·05–0·1 g./m^2 Telvar (monuron) and 0·05–0·1 g./m^2 DCMU. It is realized, however, that their residual effects may be deleterious to other subsequent crops and further work is considered necessary. At Hanover equally promising results were given by a proprietary substance designated Hs 55 der BASF.

2055. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med ukrudtsbekaempelse i tulipaner 1956-59. **(Experiments on weed control in tulips 1956-59.)**
Med. Statens Forsøgsvirks. **629**, 1959, pp. 4.

In preliminary trials with 5 herbicides (pre- and post-emergence) Shell Weedkiller DNC was phytotoxic; the others, which showed promise and are to be tested further, were Sevtox [DNBP] plus diesel oil, Aamergans [PCP], BAC-1122 and CIPC.

Weed control in tobacco.

2056. WURGLER, W.
Observations sur les réactions du tabac à l'application de quelques herbicides. **(Effects of some herbicides on tobacco plants.)** [English, German and Italian summaries ¼ p. each.]
Landw. Jb. Schweiz, 1959, **8**: 597-604, illus.

Herbicides containing phenoxy-alkylcarboxylic acids (2,4-D, MCPA and MCPB), even at low concentrations, caused some distortion of young tobacco plants. The lower parts of the stems became thickened, produced numerous adventitious roots and were inclined to break. The plants remained dwarfed, produced small leaves of no commercial value and flowered early. On plants treated with trietazine (2-chloro,4-ethylamino,6-diethylamino-*s*-triazine) some leaves developed interveinal chlorosis and died.—Stat. féd., Lausanne.

2057. Racovitza, A.
Nouvelles observations sur la germination des graines d'*Orobanche ramosa* L. **(Further observations on seed germination in *Orobanche ramosa*.)**
J. Agric. trop. Bot. appl., 1959, **6**: 111-14, bibl. 4.

The stimulating action of root secretions from *Carum ajowan* on the germination of seeds of *Orobanche ramosa* was significantly increased by applying superphosphate to the soil, and by increasing the diurnal temperature variation. Superphosphate increased the number of parasitic haustoria fixed on the *Carum* roots but checked their growth and killed many of them. Variation of temperature checked haustorial growth in the presence, but increased it in the absence, of superphosphate. Without *Carum* there was no germination in either untreated or fertilized soil. If *C. ajowan* were used with a liberal superphosphate application as a crop preceding tobacco, it should be a valuable means of controlling the tobacco parasite *O. ramosa*. [See also *H.A.*, 29: 1337.]

Weed control in tropical and subtropical crops.

(*See also* 2963, 3054.)

2058. Robinson, J. B. D.
Chemical weed control in coffee.
Kenya Coffee, 1959, **24**: 445-9, bibl. 41, illus.

See *H.A.*, 29: 3526.

2059. Singh, B.
Effect of temperature on different concentrations of diesel oil sprays suited to kill the bandha parasite (*Dendrophthoe falcata* (L.f.) Ettings.)
Hort. Advance, 1958, **2**: 68-71, bibl. 1.

Diesel oil emulsion, at concentrations ranging from 30 to 55%, was applied as a spray during each month of the year to trees of orange, guava, sapodilla and jujube parasitized with *Dendrophthoe falcata*. During summer the parasite was killed more rapidly and even by the lower concentrations. In May (max. mean temperature 35·8° C.) the parasite was killed within 20 days of spraying with 30% oil emulsion, whereas in January (max. mean temperature 21·1° C.) the parasite took 70 days to die after spraying with 55% oil emulsion. The effects on the various hosts are also given. [See also *H.A.*, 28: 2456.]—B.R. College, Agra.

2060. Anon.
Kill mistletoe.
Rur. Res. C.S.I.R.O., 1959, No. 29, pp. 24-9, bibl. 6, illus.

Parasitism of eucalyptus by *Amyema pendula* was successfully controlled by injection of the trunk with 10% 2,4-D in 10% triethanolamine. Dose and time of injection depended on trunk diameter and species.

2061. Bustamante B., N. A.
Efectividad de seis herbicidas en el combate de malezas en caña de azúcar (*Saccharum officinarum* L.). **(Efficacy of six herbicides for the control of weeds in sugar cane.)** [English summary ½ p.]
Acta agron. Palmira, 1958, **8**: 125-41, bibl. 31.

For pre-emergence application 2,4-D at 4 and 5 lb. per ha. was the most effective herbicide, giving good control of dicotyledonous weeds and fairly good control of grasses. Post-emergence application of herbicides proved unsatisfactory.

2062. Vilela, M.
O cultivo químico motomecanizado da cana-de-açúcar. **(Mechanized chemical culture of sugar cane.)**
Rev. Agric. Piracicaba, 1959, **34**: 95-100, bibl. 6.

The application by tractor-drawn sprayer 12 days after planting of 4 l. 2,4-D per ha., at a concentration of 0·655 l. per 100 l. water, reduced weed growth to 8 plants per 1·5 sq. m., compared with 126 in the control. The treatment had a minimum residual effect of 50 days' duration. *Cyperus rotundus* and grasses were not controlled. The 6 commonest broad-leaved weeds are named.—Univ. S. Paulo, Piracicaba.

2063. Bieske, G. C.
Gambia pea control.
Cane Grs' quart. Bull., 1959, **23**: 52.

Crotalaria goreensis, previously a popular green manure, has now become a weed problem. Preliminary experiments showed that 2,4,5-T at ½ lb. a.e. per acre gives excellent control.

Weed control in turf.

2064. DeFrance, J. A., and Kollett, J. R.
Annual bluegrass (*Poa annua*, L.) control with chemicals.
Golf Course Rptr, 1959, **27**(1): 14, 16, 18, bibl. 5.

The initial stages of an experiment on the control of annual bluegrass in a lawn of mixed grasses are described. Copper chloride at approximately 5 kg./ac. gave 87% control of bluegrass and caused moderate discoloration of the turf grasses. Copper carbamate at 5 kg./ac. gave 35% control with no discoloration. Tri-basic copper sulphate at 5 kg./ac., and bordeaux mixture at 195 kg./ac. each gave 65% control and showed very little discoloration. Sodium arsenite at 0·65 kg./ac. gave 78% control and only slight discoloration. Lead arsenate in a single application of 1,306 lb./ac. (incorporated into the soil of the seedbed by raking to a depth of approximately 1 in. prior to seeding) gave 35% control; when applied as 2 treatments (436 lb./ac. incorporated into the seedbed prior to seeding, followed by 2 surface applications of 436 lb./ac. each when the turf was established) it gave 74% control; no discoloration was observed with the latter treatment, but very slight discoloration and some inhibition of emergence was noticed on the plots which received the single application of lead arsenate. *Spergula arvensis* and *S. rubra*, which infested all plots, were controlled by all copper compounds and in particular by copper chloride which eliminated them.—Agric. Exp. Stat., R.I.—From *Weed Abstr.*, **8**, No. 2006.

2065. SANTELMANN, P. W.
Chickweed control in lawns.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 160-1.

When applied in late December to an established Kentucky bluegrass lawn with weeds 2–3 in. high, 2,4,5-TP at 1 lb./ac. gave 100% control of *Stellaria media*, CIPC at 2 lb./ac. 90% and dinoseb at 1 lb./ac. 80% control. When applied in March, 2,4,5-TP was slightly less effective and dinoseb slightly more effective. *Lamium amplexicaule* was also completely controlled by 2,4,5-TP at 1 lb./ac. in December and at 1·5 lb./ac. in March, when, however, some slight turf injury was caused.—Agric. Exp. Stat., College Park, Md.—From *Weed Abstr.*, **8**, No. 1920.

2066. GALLAGHER, J. E., AND OTTEN, R. J.
New chemicals for pre-emergence crabgrass control.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 149-54.

The best results were obtained with 2,3,6-trichlorophenylacetic acid (sodium or amide), which at 3 lb./ac. gave 85% control of crabgrass (*Digitaria* sp.) with no injury to turf (Kentucky bluegrass and creeping bent); at 6 lb./ac. it gave 97% control with only slight temporary turf discoloration. 2,5-Dichloro-3-nitrobenzoic acid (Dinoben) was even less injurious to turf but required 2–3 applications of 8–10 lb./ac. to give satisfactory crabgrass control; a granular formulation on vermiculite appeared to be more effective than the liquid spray. Chlordane at 60 lb./ac. gave 78% control with a granular formulation, compared with only 56% as a spray.—Amchem Products Inc., Ambler, Pa.—From *Weed Abstr.*, **8**, No. 1918.

2067. KOLLETT, J. R., AND DEFRANCE, J. A.
Crabgrass control with post-emergence chemical treatment.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 155-9, bibl. 4.

When applied in 5 gal. of water per 1,000 sq. ft. to *Digitaria ischaemum* in the 2–3-leaf stage, and again one week later, 100% control was obtained with granular material B (disodium methyl arsonate hexahydrate 2·5%) at 3·6 lb., AMA (octyl and dodecyl ammonium methyl arsonate 8%) at 0·5 lb. and PMA 10% at 2·5 oz. Disodium methyl arsonate 44% at 0·33 lb. and PMA 10% at 2 oz. gave 97 and 98% control respectively. None of the compounds except PMA caused more than slight temporary injury to the turf, which was composed of red fescue, Kentucky bluegrass and colonial bentgrass.—Agric. Exp. Stat., Kingston, R.I.—From *Weed Abstr.*, **8**, No. 1919.

2068. ENGEL, R. E., MEGGITT, W. F., AND FULWIDER, J. R.
Influence of winter and spring applications of pre-emergence herbicides on control of crabgrass.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 147-8.

In trials in 3 different areas with pre-emergence applications on various dates between December and June chlordane gave the best and most consistent control of crabgrass (*Digitaria* sp.) when applied from mid-March to mid-April at 80 lb./ac. Reducing the rate to 60 or 40 lb./ac. increased the need for specificity in time of treatment. At 60 lb./ac. attaclay and vermiculite as carriers gave similar results. Lead arsenate at 871 lb./ac. and Pax (a product containing arsenious oxide, lead arsenate, soluble nitrogen and a trace of chlordane) at 1,350 lb./ac. both gave unsatisfactory control, except in 1 trial with Pax applied on 24 December and on 4 April. Pax caused temporary turf discoloration.—Rutgers Univ., New Brunswick, N.J.—From *Weed Abstr.*, **8**, No. 1917.

2069. MOWER, R. G., AND CORNMAN, J. F.
Observations on pre-emergence and post-emergence crabgrass control; on the control of *Veronica filiformis* with endothal; and on the effectiveness of 2,4,5-TP in controlling a variety of turf weeds.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 162-71.

For some of the results see *Weed Abstr.*, **8**, No. 1921.

Weed control in vegetables.

(*See also* 1554, 2030, 2100, 2208, 2306, 3040, 3060, 3083.)

2070. MICHIELS, A.
La cyanamide calcique et la protection des plantes. **(Calcium cyanamide and plant protection.)**
Rev. Agric. Brux., 1959, **12**: 697-701.

Rates and times of application are given for calcium cyanamide as a herbicide for beetroots, beans, peas, onions and asparagus. It has also proved an effective slug killer, and has shown promise of controlling nematodes and crane-fly (*Tipula* spp.) larvae.

2071. Danielson, L. L., and Wester, R. E.
Logarithmic sprayer evaluation of herbicides in horticultural crops.
Weeds, N. York, 1959, **7**: 324-32, bibl. 4, illus.

Results of logarithmic or variable-dosage spraying indicated that 0·625 lb./ac. of EPTC was non-injurious to kale, collards, cabbage, broccoli, brussels sprouts, cauliflower, mustard and turnip greens, but caused marked injury to spinach and lettuce. Hanover salad tolerated 1·25 lb./ac. of the herbicide. The above mentioned crops also tolerated CDEC at 1 lb./ac. + CIPC at 0·5 lb./ac., which showed promise for the control of *Stellaria media* and *Lamium amplexicaule*.—U.S. Dep. Agric., Beltsville, Md.—From *Weed Abstr.*, **8**, No. 1837.

2072. Fang, S. C., and Theisen, P.
An isotopic study of ethyl-*N*,*N*-di-*n*-propylthiolcarbamate (EPTC-S^{35}) residue in various crops.
J. agric. Food Chem., 1959, **7**: 770-1, bibl. 3.

A rapid method for the separation and subsequent determination of EPTC is described. EPTC-S^{35} as a pre-emergence treatment was applied to seedbeds of various crops including sweet corn, peas, carrots and cabbage. The various residues found are shown; the greatest was less than 3% of the total amount absorbed.

2073. Anon.
Weed control in cucumbers, Hawkesbury Agricultural College, 1958-59.
Mon. Agrostology Notes for Field Officers, 1959, No. 81, pp. 1-2.

The percentage weed reduction of both monocotyledons and dicotyledons, when treated with the following chemicals is shown: CDEC 6 lb./ac., amitrol 6 lb./ac., Alanap (NPA) 4 and 12 lb./ac., DCU 10 and 20 lb./ac. and monuron 0·75 lb./ac. Monuron decreased both the number and weight of cucumber plants by about half compared with the control plot, and DCU, especially at 20 lb./ac., reduced the numbers at maturity. CDEC was the most satisfactory treatment, and amitrol and Alanap (6–8 lb./ac.) were both superior to the control plot. Estimates of value of production in this trial are given as follows: CDEC 6 lb./ac.—£760/ac., amitrol 6 lb./ac.—£630/ac., and the control—£470/ac.—*Weed Abstr.*, **8**, No. 1999.

2074. (Peterson, L. E., and others.)
Test chemical control of weeds in vegetables.
Ia Fm Sci., 1959, **14**(2): 20.

Granular and spray pre-emergence applications of Alanap-3 at 4 lb./ac. to muskmelons gave equally good weed control with no apparent damage.

2075. Detroux, L.
Le désherbage des cultures de légumineuses à grosses graines. **(Weed control in large-seeded leguminous crops.)**
Rev. Agric. Brux., 1959, **12**: 691-5, bibl. 3.

Recommendations are made for the use of neburon, simazine and calcium cyanamide before, and of DNBP, MCPA and MCPB after, emergence in peas; and also for the application of the first 4 of these herbicides to runner, french and broad beans.

2076. Rakitin, Ju. V., and Potapova, A. D.
The use of pre-emergence herbicides. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(7): 29-33.

Propham at 3 kg./ha. and CIPC at 0·5–1·5 kg./ha. proved effective and safe for french beans.

2077. Noll, C. J.
Chemical weed control in lima beans.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 492-3.

Seven compounds at various rates were applied pre-emergence to Fordhook 242 lima beans. Plots treated with neburon at 6 and 9 lb./ac. produced slightly higher yields than those treated with dinitro at 4 lb./ac. Most of the other materials gave similar yields and weed control to those obtained with dinitro [see also *H.A.*, 28: 3613].—Pa St. Univ.—From *Weed Abstr.*, **8**, No. 1833.

2078. Trevett, M. F., and Austin, E.
Control of annual weeds in snap beans with mixtures of DNBP, CDEC or EPTC.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 503-9.

The herbicides were applied to snap beans at sowing, at emergence or at both dates. The best yield, though it was not significantly higher than the others, was given by an application of CDEC at 6 lb./ac. + dinoseb at 3 lb./ac. This treatment also gave the best control of broad-leaved weeds but was only moderately effective against grasses.—Univ. Maine, Orono.—From *Weed Abstr.*, **8**, No. 1834.

2079. Trevett, M. F., and Austin, E.
A note on the control of northern nutgrass in snap beans.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 494-5.

Land on which *Cyperus esculentus* 3–6 in. tall was growing was disked to a depth of 4 in., EPTC at 6 lb./ac. was applied and disked in, and Long Tendergreen snap beans were sown the next day. All plots were rototilled 5 times during the season. *Cyperus* control varied from 92% with no additional hoeing to 97% with one additional hoeing in July. Hoeing without EPTC gave from 0 to 10% control of *Cyperus*. Crop yields on the plots treated with EPTC greatly, though not significantly, exceeded those on plots which were only hoed. In the previous year an earlier application of EPTC did not give satisfactory control of *Cyperus*.—Univ. Maine, Orono.—From *Weed Abstr.*, **8**, No. 1914.

2080. Glastonbury, H. A., Stevenson, M. D., and Ball, R. W. E.
The persistence of 4-(2-methyl-4-chlorophenoxy) butyric acid in peas.
Weeds, N. York, 1959, **7**: 362-3, bibl. 3.

Onward peas at the 3–4-leaf stage were sprayed with MCPB at 2 lb./ac. When rain fell half an hour after spraying, the MCPB content of the crop decreased by more than 80% in the first day and reached zero after 9 days. When rain did not follow for 2 days the decrease was much slower and did not reach zero till after 15 days.—May and Baker Ltd., Dagenham, Essex.—*Weed Abstr.*, **8**, No. 1937.

2081. Jasmin, J. J., Saidak, W. J., and Lyall, L. H.
The effects of phenoxybutyric acid derivatives on canning peas in some areas in Canada.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 45-9, bibl. 6.

MCPB and in particular 2,4-DB caused some initial injury, but this did not affect later growth or yield. MCPB at 16–24 oz./ac., applied when the peas were 4–5 in. high, appeared to be safe on the varieties Perfection WR, Cansweet, Pride, Wisconsin Early Sweet and Great Giant, but caused a 6% yield reduction in Alaska Sweet Late. No differences in yield resulted from volume rates of 15, 30 and 60 gal. water/ac., but there was a trend towards better weed control as the volume was reduced.—Univ. B.C., Vancouver.—From *Weed Abstr.*, **8**, No. 1827.

2082. Anon.
Research reports. [Weed control in] field and canning peas.
Proc. 15th N. centr. Weed Control Conf., 1958, pp. 111–12.

Five reports are summarized. Various herbicides and combinations of herbicides are listed which caused no yield reduction in pea crops when applied pre- or post-emergence. Compounds causing injury included 2,4-DB and MCPB (esters) at 1–1·5 lb./ac., and to a lesser extent MCPA (sodium and amine) at 0·25–0·5 lb./ac. Some pea varieties proved more tolerant to these 3 herbicides than others.—From *Weed Abstr.*, **8**, No. 1434.

2083. Noll, C. J.
Chemical weeding of set and seeded onions grown in mineral soils.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 104-7.

CIPC at 6 lb./ac. and CDAA at 8 lb./ac. were applied pre-emergence, and potassium cyanate (KOCN) at 12 lb./ac. was applied at emergence, to onion sets of the variety Ebenezer and to onions grown from seed of the variety Yellow Sweet Spanish. When the onions were 6 in. high, the plots were treated post-emergence with KOCN at 18 lb./ac., CIPC at 3–9 lb./ac., CDAA at 8 lb./ac., and Chlorazine (2-chloro-4,6-*bis* (diethylamino) *s*-triazine) at 3–6 lb./ac. Pre-emergence CDAA gave better weed control than CIPC or KOCN. Post-emergence treatment had little effect on weed control. All treatments significantly increased the yield of set-grown onions. With onions grown from seed the plots treated with KOCN at emergence and with CIPC pre-emergence gave better yields in general than the CDAA pre-emergence plots.—Coll. Agric., Pa St. Univ.—*Weed Abstr.*, **8**, No. 1823.

2084. Bower, F. L., and Chappell, W. E.
Studies with pre-planting, pre-emergence and post-planting application of herbicides on certain vegetable crops.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 73-9.

In one trial dinoseb at 3 and 4 lb./ac. and CIPC (granular) at 6 lb./ac. applied pre-seeding seriously reduced cress vigour; CIPC at 2 lb./ac. + CDEC at 4 lb./ac. and CDEC at 4 and 6 lb./ac., applied pre-emergence, also reduced cress vigour. Acceptable weed control with satisfactory crop vigour was obtained by CIPC at 4 lb./ac. (on vermiculite) applied pre-seeding and by CDEC at 4 lb./ac. pre-emergence.—Va agric. Exp. Stat., Blacksburg.—*Weed Abstr.*, **8**, No. 1836.

2085. Price, C. D.
Pre- and post-emergence weed control in leaf crops using herbicide combinations.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 510-16, bibl. 1.

CDEC, CIPC and EPTC were used for weed control in mustard greens, turnip greens and spinach. In pre-emergence treatments CDEC at 4 lb./ac. gave the highest yields of both mustard and turnip greens, and CDEC at 1 lb./ac. + EPTC at 1 lb./ac. the highest yields of spinach. In a post-emergence trial on spinach EPTC at 5 lb./ac. produced the highest yield.—Truck Exp. Stat., Norfolk, Va.—From *Weed Abstr.*, **8**, No. 1835.

2086. Ciferri, R.
Prime prove di diserbo con CDEC. **(First trials with CDEC as a herbicide.)** [English summary 4 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 29-30, bibl. 1.

CDEC or Vegedex is a recent chloride derivative of thiocarbamic acid (2-chloroallyl-diethylcarbamate). Pre-emergence treatment of lettuce and spinach seedbeds proved fairly successful at a concentration of 10 kg./ha. but not at 5 kg./ha.

2087. Vose, H. H.
Controlling weeds in spinach.
Ark. Fm Res., 1959, **8**(4): 9, illus.

Control of henbit, *Lamium amplexicaule*, in spring planted spinach was achieved with a range of mixtures of CIPC ($\frac{1}{8}$–$\frac{1}{2}$ lb./acre) and Vegedex (1–3 qts./acre). All the mixtures reduced spinach yields by comparison with the weed infested untreated controls, but weed control facilitated mechanical harvesting.

2088. Noll, C. J.
Weeding of beets with chemical herbicides.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 108-9.

All treatments were applied pre-emergence to Seneca Detroit beets, except salt which was applied at the 4-leaf stage. The following gave yields significantly better than the control or than sodium chloride (NaCl) at 400 lb./ac.: endothal at 12 lb./ac. + TCA at 10 lb./ac. and endothal at 9 lb./ac. + TCA at 10 lb./ac. The following increased yields significantly over that of the control: NaCl at 400 lb./ac., endothal at 6 lb./ac. + TCA at 10 lb./ac., sodium 2,3-dichloroisobutyrate at 10 lb./ac., CDAA at 6–12 lb./ac., monuron at 0·5 and 0·75 lb./ac., and CDEC at 6 and 8 lb./ac.—Coll. Agric., Pa St. Univ.—From *Weed Abstr.*, **8**, No. 1826.

2089. Krylov, S. V.
Chemically treated paper mulch for seedbeds.
[Russian.]
Dokl. Mosk. s.-h. Akad. Timirjazeva, 1957, No. 29, pp. 69-73, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 72,976.

The paper was produced from sulphite kraft impregnated with different concentrations of [unspecified] herbicides. After sowing weed seeds the ground was covered with this paper, and carrot, beetroot and radish seeds were sown into perforations of various sizes. The germination of the crop seeds was retarded when they were sown into holes 5–8 mm. in diameter, but was not affected when the diameter of the holes exceeded 10 mm. Weed emergence was retarded for 60 days.

2090. Sweet, R. D., Rubatsky, V., and Romancwski, R.
Chemicals for weeding carrots.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 99-103.

Weed control by, and crop reaction to, several herbicides applied at sowing and post-emergence to carrots grown on sandy and muck soils.—Cornell Univ.—From *Weed Abstr.*, **8**, No. 1825.

2091. Lachman, W. H., and Michelson, L. F.
Weed control in carrots—1958.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 533-5.

G-30028 (propazine-2-chloro-4,6-isopropylamino-*s*-triazine) at 1, 2 and 4 lb./ac. was applied to Chantenay carrots pre-emergence, and G-30031 (2-chloro-4-isopropylamino-6-diethylamino-*s*-triazine) at 0·5–2 lb./ac., N-4562 at 1–8 lb./ac. and Sovasol No. 5 at 100 gal./ac. were applied post-emergence (17 days after sowing). The weeds were purslane (*Portulaca oleracea*), smartweed (*Polygonum* spp.), lamb's quarters (*Chenopodium album*), galinsoga (*G. parviflora*), pigweed and crabgrass (*Digitaria* spp.). Yields as good as those obtained by Sovasol were given by G-30031 at 1 lb./ac., and by N-4562 at 1, 2 and 8 lb./ac. Excellent weed control was shown by G-30031 at 2 lb./ac.—Coll. Agric., Amherst, Mass.—*Weed Abstr.*, **8**, No. 1824.

2092. Cook, M. C. F.
The commercial production of carrots and parsnips on "moss soils" in County Fermanagh.
Mon. agric. Rep. Minist. Agric. Belfast, 1959, **34**: 136-45.

Reclamation work and production methods, including weed, pest and disease control, are discussed. The main difficulty is the high weed population, but PCP (2 gal. in 100 gal. per acre) and CIPC (10 pints in 98 gal. per acre) have shown promise in pre-emergence applications, and over a season a pre-emergence application of CIPC followed by 1 post-emergence application of TVO was cheaper than 1 pre- and 2 post-emergence applications of TVO.

2093. Bruns, V. F., and Dawson, J. H.
Effects of DCB, DCB-xylene mixtures, amitrol, and sodium salt of dalapon in irrigation water on corn and rutabagas.
Weeds, N. York, 1959, **7**: 333-40, bibl. 13, illus.

The compounds used in these experiments showed promise for aquatic weed control in irrigation channels. When applied to swedes at the 6- or 7-leaf stage DCB (orthodichlorobenzene) at 740 p.p.m. alone or in a 1 : 1 or 1 : 3 mixture with xylene in 3 acre-inches of irrigation water caused injury. Dalapon at 0·5, 2·5 and 5 lb./ac. or amitrol at 2·5 lb./ac. in 3 acre-inches of water caused only slight injury to swedes.—Irrig. Exp. Stat., Prosser, Wash.—From *Weed Abstr.*, **8**, No. 1814.

2094. Sweet, R. D., and Rubatsky, V.
Herbicides for tomatoes.
Proc. 13th N.E. Weed Control Conf., 1959, pp. 84-92, bibl. 3.

Herbicides were applied to transplants 13 days after planting and to direct-seeded tomatoes immediately after sowing. Generally speaking, herbicides were less injurious when applied as granulars than as sprays. CDEC at 3–6 lb. caused no injury either as a spray or granular (on clay) when applied to direct-seeded tomatoes. Niagara

4512 at 2–8 lb. was also not injurious to direct-seeded tomatoes, and in small plot tests 30 varieties were tolerant of foliage sprays using 4–6 lb.; in greenhouse tests the rate had to be reduced to 2 lb. to prevent scorch; lamb's quarters (*Chenopodium album*) was killed by 4 lb. CIPC at 2 and 3 lb. (spray and granular) was very injurious to direct-seeded tomatoes; monuron at 1 and 1·5 (spray and granular) injured transplants and reduced yields; 2,4,5-TES (spray) at 3 and 6 lb. caused no injury and increased yields. Greenhouse trials with simazine and neburon using 2 depths of planting (0·5 and 1·5 in.), incorporation into the soil and surface application, liquid and granular formulations, and 2 methods of watering (regular surface sprinkling and 1 in. applied for 3 consecutive days followed by regular watering) resulted in no survival with simazine regardless of method. With neburon the clay formulation tended to be less toxic than the spray, but there was an interaction with the method of watering and with the method of application, the reason for which could not be explained.—Cornell Univ., Ithaca, N.Y.—*Weed Abstr.*, **8**, No. 1831.

2095. Meggitt, W. F., and Moran, C.

An evaluation of granular and spray applications of herbicides on yield and processing quality of tomatoes.

Proc. 13th N.E. Weed Control Conf., 1959, pp. 93-8.

Granular formulations of EPTC at 4–6 lb./ac., CIPC at 8 lb./ac., 2,5-dichloro-3-nitrobenzoic acid at 2 and 4 lb./ac., simazine at 1·5 and 3 lb./ac. and of neburon at 2 and 4 lb./ac. and a spray formulation of EPTC at 4–6 lb./ac. gave satisfactory weed control with no yield reduction when applied after the last cultivation to Rutgers and Campbell 146 tomatoes on sandy loam. Dinoseb (granular) at 6 lb./ac. reduced yields, but not significantly. Simazine spray at 2 and 3 lb./ac. significantly reduced yield and size. Neburon spray at 4 lb./ac. significantly reduced yield and at 3 lb./ac. tended to reduce yield and fruit size. Some injury was observed from all sprays and from dinoseb (granular) but not from the other granular treatments. There was no taint in tomato purée from EPTC or CIPC treatments (the only 2 evaluated in taste tests). Only simazine affected the titratable acidity of canned purée. EPTC tended to produce a lower colour index than the control and than other herbicides.—Rutgers Univ., New Brunswick, N.J.—*Weed Abstr.*, **8**, No. 1830.

2096. Hughes, B. R., Noll, C. J., and Odland, M. L.

Evaluation of certain granular herbicides on injury and weed control in tomatoes.

Proc. 13th N.E. Weed Control Conf., 1959, pp. 521-2, bibl. 7.

Five weeks after planting out, Rutgers tomatoes were treated with granular CIPC at 3 and 6·5 lb./ac., neburon at 4 and 7 lb./ac., Randox [CDAA] at 5 and 8 lb./ac., Vegedex [CDEC] at 5 and 8 lb./ac., dinitro at 5·5 and 16 lb./ac. and ACP-M622. Yields were increased by Randox at 5 lb./ac. and Vegedex at 8 lb./ac., both giving good, but not the best, weed control; yields were reduced by dinitro at 5·5 lb./ac. and by CIPC.—From *Weed Abstr.*, **8**, No. 1828.

2097. Rahn, E. M.

Control of northern nutgrass and other weeds in potatoes and tomatoes in 1958.

Proc. 13th N.E. Weed Control Conf., 1959, pp. 80-3.

Several herbicides at different rates were applied to Delaware 13-2 tomatoes following cultivation about 5 and 8 weeks after planting. The only treatment to give full-season control of *Cyperus esculentus* as well as annual weeds without crop injury or yield reduction was EPTC granular, which at 10 lb./ac. gave 100% nutgrass control and at 5 lb./ac. 80% control. CDAA granular at 6 lb./ac. gave 80% nutgrass and broad-leaved weed control without tomato injury, but general grass control was only 50%. Other materials were either ineffective for nutgrass control, injured the tomatoes or both.—Delaware Univ., Newark.—From *Weed Abstr.*, **8**, No. 1832.

2098. Price, C. D.

Control of weeds in tomatoes and sweet corn.

Proc. 13th N.E. Weed Control Conf., 1959, pp. 517-20, bibl. 2.

When 5 herbicides in spray and/or granular forms were applied to Rutgers tomatoes at lay-by against *Digitaria sanguinalis*, there were no significant differences in yield and all compounds gave satisfactory weed control. The best performance was shown by EPTC granular at 6 lb./ac., giving 100% control of *Digitaria*, and by neburon spray at 4 lb./ac., giving 98% control.—Truck Exp. Stat., Norfolk, Va.—From *Weed Abstr.*, **8**, No. 1829.

2099. Wilhelm, S., and others.

Large-scale soil fumigation against broomrape.

Phytopathology, 1959, **49**: 530-1, bibl. 1, illus.

Details are given of equipment and procedure for applying methyl bromide at 180 lb. per acre, 8 in. deep, and covering with polythene sheeting. This treatment was effective against weeds and nematodes as well as *Orobanche ludoviciana* var. *cooperi*, a parasite of tomatoes.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1490, 1497, 1504, 1508, 1509, 1581, 1594, 1597, 1758, 1761, 1971, 2070, 3036, 3042, 3043, 3050-3052, 3060-3062, 3066, 3079, 3080.)

2100. OHIO VEGETABLE AND POTATO GROWERS' ASSOCIATION.
Growers' Handbook and 44th Annual Proceedings 1959, pp. 100.

In this handbook there are articles on insect resistance to insecticides, soil testing for greenhouse crops, insect control in field-grown vegetables, cutting costs in vegetable growing, and recommendations on chemical weeding and fungicides. Growers' experiences with mobile greenhouses and growing lettuces are also described.

2101. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.
Thirty-ninth Annual Report of the N.I.A.B., 1958, 1959, pp. 56.

Reports are given of variety trials with brussels sprouts, broccoli and cauliflowers, carrots, onions, runner beans and spring cabbages. Seed testing for several vegetables is briefly reported.

2102. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.
Guide to varieties of field and vegetable crops under trial, observation and propagation, 1959, 1959, pp. 71.

2103. RAGAZZI, G.
La produzione delle sementi da orto nel forlivese. (**Vegetable seed production in Forlì province.**)
Sementi elette, 1959, 5(4): 30-41, illus.

Production figures and impending regulations.

2104. KASINOV, V. B.
The effect of alternate wetting and drying of seeds of some plants. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 110-13, bibl. 8.

Seeds from 12 different plants were soaked for 24 or 12 hours in water at 20° C. (water-melon, soya beans and beans for 24, the others for 12 hours) and then dried at 20° C. until they were back to their normal weight. Seeds given this treatment twice showed an accelerated rate of germination, and with melons and water-melons the percentage germination was also markedly increased. Soya bean and bean seeds, however, suffered mechanical injury during this process.

2105. SRIVASTAVA, B. K., AND BHATIA, S. K.
On the germinability of some summer vegetable seeds fumigated with ethylene dichloride and carbon tetrachloride mixture.
Indian J. Hort., 1959, **16**: 42-6, bibl. 5.

Fumigation tests in the laboratory were carried out with a 3 : 1 mixture of ethylene dichloride and carbon tetrachloride. No evidence was obtained that fumigation affected the viability, the rate of germination or the production of normal seedlings in any of the following vegetables: *Luffa cylindrica*, *L. acutangula*, *Lagenaria siceraria*, *Citrullus vulgaris*, *Cucurbita moschata*, *Trichosanthes anguina*, *Momordica charantia* and *Abelmoschus esculentus*.—Indian agric. Res. Inst., New Delhi.

2106. SCHMIDT, H., AND MELTZER, H.
Vergleichende biologische und chemische Untersuchungen von quecksilberhaltigen Trockenbeizmitteln—ein Beitrag zur Beizmittelprüfung. (**Comparative biological and chemical studies of mercury-containing dry seed dressings—a contribution to the testing of seed dressings.**) [Russian and English summaries 22 and 17 lines.]
NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 150-3, bibl. 5.

Cucumber seeds infested with *Cladosporium cucumerinum* proved suitable for a bio-assay test of mercurial seed dressings.

2107. KRÖDEL, F.
Der Einfluss der Inkrustierung von Gemüsesaatgut auf Keimenergie und Keimfähigkeit. (**The effect of pelleting on vegetable seed viability and germination.**)
Saatgut-Wirtsch., 1959, **11**: 205-6.

Pelleting the seeds of many vegetables with Alvit 55, produced by Schering A.G. as a prophylactic against vegetable flies, did not affect germination, except where seed samples already showed poor viability.

2108. DODILLET, H.-J.
Das Licht-Temperatur-Verhältnis bei der Anzucht verschiedener Gemüsepflanzen. (**The light-temperature relationship in the raising of various vegetable seedlings.**)
Gartenbauwiss., 1958, **5**: 548-53, bibl. 9.

At 4,000–10,000 Lux optimum temperatures ranged from 25° to 27·5° C. for cucumber, from 19·7° to 22·5° C. for kohl-rabi and from 23·4° to 28° C. for tomato. These temperatures proved to be characteristic of the vegetable species in question and to remain valid for the period from germination to transplanting.—Inst. Gemüseb. tech. Univ. Berlin.

2109. LISOVENKO, S. I.
New ideas in the mechanization of vegetable growing. [Russian, with English, German and French summaries.]
Vestn. selkhoz. Nauki, 1959, 4(3): 79, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**, Abstr. 1,608.

In the method of sowing vegetable crops, such as carrots and onions, recommended, both the seed and fertilizer are sown over a band 15 cm. wide at the normal rates of sowing. The drills are mid-mounted on an implement carrier and feed the special sowing mechanism. This comprises a coulter, followed by a fertilizer feed tube incorporating 70-mm. long distributing pegs arranged 25 mm. apart in a spiral pattern ending 50 mm. above ground; a 40-cm. diameter, 15-cm. wide roller prepares a strip of ground on to which the seed is deposited from a similar tube having 30-mm. long pegs, 15 mm. apart and 70 mm. above ground. Two concave covering discs and chains complete the operation.

2110. Paponov, A. N.
Influence of spacing on plant development in soils of different fertility. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 5, pp. 197-210, bibl. 53, illus.

Russian literature on plant spacing is reviewed. Experiments with lettuce, radish, tomato, cucumber and dill showed that thick sowing of seeds increased the number of leaves produced before the flowers were formed and thus delayed flowering. The effects resembled those produced by soils of low fertility.

2111. Stanley, J. M.
Electric heating of hotbeds.
Leafl. U.S. Dep. Agric. **445**, 1959, pp. 8, illus.

Instructions for the construction and wiring of a hotbed for raising vegetable plants.

2112. Anon.
Erfahrungen mit Torf im tropischen Teil der arabischen Halbinsel. (**The use of peat in the tropical part of the Arabian Peninsula.**)
Torfnachrichten, 1959, **10**(3/4): 7-8.

A brief note on the apparently successful introduction of large quantities of peat and its use in establishing a garden for vegetables and other plants as part of the Research and Demonstration Farm set up by the Government of Saudi Arabia. The chief advantage of peat would appear to lie in its water retaining capacity.

2113. Boekel, P.
De invloed van structuurregelaars op grond en gewas. (**The effect of soil conditioners on soil and crop.**) [English summary ½ p.]
Landbouwk. Tijdschr., 1959, **71**: 529-37, bibl. 9.

Of 8 soil conditioners tested on a sandy clay soil, only Krilium Merloam, Aerotil and, to a lesser extent, Rohagit improved soil structure, estimated on percentage pore space. Tests with several field crops and vegetables, however, showed that the improvement in soil structure was not always reflected in an improvement in plant growth; with swedes the effect was very unfavourable and with peas it was at first favourable and later unfavourable.—Inst. Bodemvruchtb., Groningen.

2114. Pearson, R. K., Odland, M. L., and Noll, C. J.
Effect of aluminum mulch on vegetable crop yields.
Progr. Rep. Pa agric. Exp. Stat. **205**, 1959, pp. 7, bibl. 3, illus.

Foil of widths varying from 1½–6 ft. and of 0·0015- and 0·004-in. gauge was used on tomatoes, peppers, lima beans, cucumbers, carrots and lettuce during 3 seasons. In 1955, a hot dry year, the mulch markedly enhanced yields, tomatoes increasing by 165% and cucumbers by 290%. Although in the following year rainfall was adequate, some beneficial effects were obtained. Rainfall for 1957 was below average, but temperatures were not very high and substantial yield increases resulted. The heavier gauge was used to examine the feasibility of leaving it in position for 2 or more seasons. The results illustrated that this gauge can serve 2 seasons and, with care, possibly a third, but fertilizer application difficulties may preclude its use for 3 seasons.

2115. Cselőtei, L.
A hőmérséklet hatása a zöldségnövények vízforgalmára. (**The effect of temperature on water regime of vegetables.**) [English and Russian summaries ¾ p. each.]
Növénytermelés, 1959, **8**: 333-48, bibl. 36, illus.

The investigations described here were concerned with the transpiration of a wide range of vegetables, controlled pot experiments being supplemented by field trials. Numerical data obtained with celeriac and lettuce seed plants are given in detail. In many species during certain stages of development a close correlation (+ 0·80–0·82) was found between the average daily temperature and rate of transpiration, and, when the temperature did not drop for long much below that required for optimum growth, the relationship between the two was almost linear. There was a similar correlation (+ 0·80–0·85) between transpiration and the atmospheric vapour pressure deficit. Hence, these two environmental factors very largely controlled transpiration. On days when the temperature range for optimal growth was reached for only short periods, transpiration was determined by the length of these periods. Since wind in the summer was usually followed by rain, the total seasonal transpiration was not significantly affected by wind. The test crops showed specific differences in both rates of transpiration and in temperature-induced variations in these rates.

2116. Weber, A.
Magnesiummangel. II. Forsøg og undersøgelser på friland og i store urtepotter 1953-57. (**Magnesium deficiency. II. Experimental studies in the field and in large containers 1953-57.**) [English summary 2¼ pp.]
Tidsskr. Planteavl, 1959, **63**: 394-447, illus.

The experiments described have been carried out in continuation of earlier work [see *H.A.*, 27: 548]. Green-leaved varieties of nasturtium, notably Golden Gleam, have proved good indicators of Mg deficiency. The experiments were carried out with a number of vegetable crops grown in a soil which showed K-induced Mg deficiency. Among the many results reported are: Tomatoes raised in Mg-deficient soil developed 7 new chlorotic leaves in a month. Shallots and spinach, on the other hand, did not exhibit any symptoms of Mg deficiency. With tomatoes, $MgSO_4$ (spraying with a 5% solution or with a 3% solution plus ground treatment) increased both total fruit yields and the percentage of early fruit. Also with tomatoes, a lowering of the soil pH value, resulting from the addition of sulphur, increased yields in the absence of Mg applications. Spinach responded similarly to sulphur. Applications of 1,000 kg. $MgSO_4$ per hectare raised the Mg content of the surface soil by almost 2 mg. per 100 g. In another study sand cultures were used to investigate the effect of certain nutrients on the expression of Mg deficiency. In general, it was found that symptoms of Mg deficiency tend to disappear in the autumn, even where they had been severe in summer. [For a short version of some aspects of this work see *H.A.*, 29: 1384.]—Danish Plant path. Inst., Lyngby.

2117. ANON.
Molybdenum deficiency in plants.
Agric. Gaz. N.S.W., 1959, **70**: 418-23, illus.

A review, including symptoms and control in vegetable crops.

2118. STELMACH, Z.
Bromine retention in some soils and uptake of bromine by plants after soil fumigation.
Soil Sci., 1959, **88**: 61-6, bibl. 25.

Ethylene dibromide, methyl bromide, and sodium bromide were used to determine the effect of Br on the Br content of plants and soils. Field experiments were located on Hillsdale sandy loam, Brady loam and Houghton muck. Sodium bromide was applied in the greenhouse on Brookston clay loam, Oshtemo loamy sand and Houghton muck. Cabbage, snap beans, and table beets were grown on the treated soils and the effects of the treatments observed. Both crops and soils were sampled and analysed at intervals during the growing season. The bean and cabbage plants showed the highest content of bromine at the initial sampling date. Beets growing in sodium-bromide-treated pots in the greenhouse contained as high as 978 p.p.m. Br and outyielded those not receiving Br. However, lower yields of beets were obtained in the field where the Br content of the roots was 975 p.p.m. Sodium bromide and methyl bromide lowered the yield of cabbage and beans in 1953. This did not occur with beans and beets in 1954 where methyl bromide was used. Damping-off disease apparently caused diminished yields of beets grown on Houghton muck where ethylene dibromide was applied. The native Br content was similar in Oshtemo and Brookston soils but was low in Houghton muck. In bean plants grown on untreated soil the highest Br content was in stems, next in roots, and lowest in leaves, whereas in bean plants from Br-treated soil the order was: roots>leaves>stems. [Author's summary. This work was previously noted from another source in *H.A.*, 28: 1546m.]—Mich. St. Univ.

2119. REDDY, B. R.
The germination of vegetable and field crop seeds as affected by two soil fumigants.
Diss. Abstr., 1959, **20**: 843, being *L.C. Card No. Mic.* 59-3562 of 169 pp.

The germination of most of the seeds tested [crops not specified] was inhibited in the presence of DD and EDB fumigants. The vapours of these fumigants are partly absorbed by water and change its pH, and the use of exposed water for the culture of seeds resulted in decreased germination. The germination of dry seeds was decreased at the higher concentrations and by longer periods of exposure to the fumigants, but subsequent aeration for 10 days after exposure helped to restore germination to a normal level. A high moisture content of the seeds was an important factor in reducing the germination of fumigated seeds, and fumigant toxicity also increased with humidity and temperature. At soil temperatures higher than 68° F. the toxicity to germinating seeds was reduced by rapid volatilization and escape of the fumigants. Fumigant toxicity was increased by the use of a water seal immediately after fumigation, and toxicity was greater in sandy loam soils than in sandy soils. In all tests DD reduced seed germination more than EDB, but the latter was more toxic to transplanted tomato seedlings.—Univ. Fla.

2120. BREMER, H.
Vektorenbekämpfung bei Viruskrankheiten im Gemüsebau? **(Can the vectors of virus diseases of vegetables be controlled?)**
Anz. Schädlingsk., 1958, **31**: 65-7, bibl. 36.

A review.

2121. GROSSMANN, F., AND STECKHAN, D.
Nebenwirkungen einiger Insektizide auf pathogene Bodenpilze. **(Side effects of several insecticides on pathogenic soil fungi.)** [English summary ⅓ p.]
Z. PflKrankh., 1960, **67**: 7-19, bibl. 17, illus.

On agar plates the insecticides lindane, chlordane and aldrin showed considerable fungicidal activity against several fungi, but when used in the field at normal concentrations the only pathogen partially controlled was *Ophiobolus graminis* on wheat. *Pythium* sp. on sugar beet, *Rhizoctonia solani* on cauliflower and *R. crocorum* on carrots were little affected by the insecticides, except at concentrations so high that they injured the plants.—Univ. Göttingen.

2122. SOUTH AUSTRALIA, DEPARTMENT OF AGRICULTURE.
Heliothis caterpillars.
J. Agric. S. Aust., 1959, **63**: 62-3, illus.

And their control on peas, beans, tomatoes, peaches, etc., with DDT.

2123. HOWITT, A. J., WATERHOUSE, J. S., AND BULLOCK, R. M.
The utility of field tests for evaluating insecticides against the garden symphylid.
J. econ. Ent., 1959, **52**: 666-72, bibl. 8, illus.

From 1955 to 1957 a total of 54 acres was established in field plots [of various vegetables and mint] to evaluate compounds for the control of *Scutigerella immaculata* Newport. Productive results were obtained in approximately 10% of the plots. Interpretation of results was complicated in the remainder of the plots by the irregular distribution pattern, non-feeding phases, and preferential feeding habits of the pest. Although it failed to give control in some trials, parathion used as a soil treatment at the rate of 5 lb. of active ingredient per acre consistently gave better results than any of the other insecticides tested. [Authors' abstract.]—Wash. agric. Exp. Stat., Pullman.

2124. HOWITT, A. J.
Laboratory and greenhouse tests for evaluating compounds in the control of the garden symphylid, *Scutigerella immaculata* (Newport).
J. econ. Ent., 1959, **52**: 672-7, bibl. 4, illus.

In laboratory tests of 46 compounds mixed with the soil to give a concentration of 2·5 p.p.m., only parathion, UCC 8305 (*p*-chloro-2,4-dioxa-5-methyl-p-thiono-3-phosphabicyclo (4.4.0) decane), V-C 13 (*O*-2,4-dichlorophenyl *O,O*-diethyl phosphorothioate), Am. Cyanamid E.N. 18133 (*O,O*-diethyl *O*-2-pyrazinyl phosphorothioate) and lindane were initially toxic and possessed some degree of residual effectiveness. Am. Cyanamid E.N. 18133 gave outstanding results and appeared to be the most promising material. When greenhouse beds planted to tomatoes were treated with Chlorthion, malathion, parathion or Dipterex at 10 lb./acre, with or without a wetting agent, the plants were killed or severely stunted, and symphylid counts remained above economic levels of infestation.—Wash. agric. Exp. Stat., Pullman.

2125. HOWITT, A. J.
Control of *Scutigerella immaculata* (Newport) in the Pacific Northwest with soil fumigants.
J. econ. Ent., 1959, **52**: 678-83, bibl. 7, illus.

Ethylene dibromide and 1,2-dibromo-3-chloropropane were ineffective in controlling the garden symphylid, *Scutigerella immaculata*, when applied to established strawberries and mint, and Vapam applied to black raspberries gave similar unsatisfactory results. In subsequent trials in the field under controlled conditions, methyl bromide and 1,3-dichloropropene (Telone) were the most effective fumigants. On a 4-acre field treated with 20, 30 and 40 gal./acre of Telone and planted with cabbage 19 days later, symphylid populations were kept low for 3 months, weed growth was greatly reduced and yields were increased.—Wash. agric. Exp. Stat., Pullman.

2126. MURTHY, D. V.
A preliminary note on the control of red-ant (*Solenopsis geminata* Fabr.) on some of the vegetable crops.
Mysore agric. J., 1959, **34**: 9-14, bibl. 6, illus.

Control of red ants on vegetable crops, including egg plants, cabbages and okra, was obtained by spraying with 20% heptachlor (1 oz. in 1¼ gal.), 75% chlordane (1 oz. in 4 gal.) and Aldrex 30 (1 oz. in 2 gal.). The first named was slightly more effective than the others.

2127. RUPPEL, R. F., AND POSADA, L.
Estudios de molusquicidas para el control de la babosa pequeña, *Deroceras reticulatum* (Muller). (**Studies on molluscicides for control of the small slug, *Deroceras reticulatum*.**) [English summary 1 p.]
Agric. trop. Bogotá, 1959, **15**: 643-60, bibl. 31.

Wheat bran, wheat shorts or sesame seed cake were better than lucerne meal or macerated cabbage as carriers for the poisons, among which the highly effective ones were: a 2·5% mixture of DNBP and dinitroamylphenol; 2·5% and 5% metaldehyde; 2·5% DNBP and certain of its salts; 3% sodium fluorosilicate + 2·5% metaldehyde; 5% calcium arsenate + 3·25% metaldehyde; 7% calcium arsenate; 2·5% DNOC; 1% Thimet; 2·5% PCP; 2·5% Pyrolan; 2·5% Pyramat; and 2·5% chlordane. The most effective spray treatment tested was 0·3% metaldehyde, and the best dusts were 5% metaldehyde or 5% calcium arsenate + 2·5% metaldehyde.

2128. BURGOS URIBE, L. J.
Bioanálisis de los residuos de varios insecticidas en tres plantas de cultivo. (**Bioassay of the residues of certain insecticides on three crop plants.**) [English summary 1 p.]
Acta agron. Palmira, 1958, **8**: 101-24, bibl. 56, illus.

Bioassays of the duration of the residual effect of DDT, parathion and endrin on beans and of endrin, aldrin and malathion on tomatoes (maize was the third crop) showed that toxicity falls rapidly and is low after 10 days. It was concluded that insecticidal treatments should be repeated every 10–12 days.

2129. Van Middelem, C. H., and Waites, R. E.
Demeton residues on turnips, squash, tomatoes, peppers and snap beans.
J. econ. Ent., 1959, **52**: 741-4, bibl. 7.

The residues were determined by a cholinesterase inhibition technique. On the basis of the data reported, a week is considered to be a safe interval between the last demeton foliar application and the harvesting of turnip roots, squashes, tomatoes and peppers, following three applications of 4 oz. active material at intervals of 7 to 10 days. For snap beans the interval between the last treatment and harvest should be 2 weeks, and for turnip tops not less than 3 weeks. Residues from soil applications of demeton persisted considerably longer, although treatment at transplanting would appear safe. [For residues on other vegetables see *H.A.*, 28: 3658 and 3796w.]—Fla agric. Exp. Stat., Gainesville.

2130. Hopkins, H., and Eisen, J.
Mineral elements in fresh vegetables from different geographic areas.
J. agric. Food Chem., 1959, **7**: 633-8, bibl. 20.

The concentrations of 10 elements, including P, Mg, Mn, Fe, Ca, Na and K, in asparagus, beans, cabbages, carrots, celery, lettuces, onions and tomatoes are tabulated. High values for all elements were generally found in asparagus, beans and carrots, and the Na content of carrots and celery was exceptionally high. Marked divergencies between producing areas were found for the Na content of onions and lettuces (the latter probably associated with the Na content of irrigation water) and for the Mn content of carrots and celery. However, the results are considered to show that element binding specificity in different plant parts and between different species is probably more decisive than environmental factors.—U.S. Dep. Agric., Beltsville, Md.

2131. Virtanen, A. I.
Aspects on antimicrobial substances in cultivated plants. [In English.]
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 162-79, bibl. 36.

A review, including references to antibiotic substances in onions, brassicas and carrots, and to anti-thyroid factors in brassicas. [See also *H.A.*, 29: 2692.]

2132. Anon.
Grower makes his own crop washer.
Grower, 1960, **53**: 177, illus.

This small machine, now on the market as the Don Washer, can be used for swedes, carrots, beetroot, sprouts and possibly radishes. The machine costs £55, and the working cost is 10d. for 25 bushels of sprouts.

2133. Smith, H.
The application of hydrocooling in the United Kingdom.
Worc. agric. Chron., 1959, **27**: 94-9, illus.

Spring cabbages and watercress have been successfully hydrocooled in the U.K. Spinach, green onions and possibly lettuces appear to be other suitable vegetables. Spring cabbage may increase in weight by 4–5% following hydrocooling, and if it is refrigerated, insulated or at least covered on the way to market will appear crisper on arrival. For spring cabbage 15 min. immersion in water at 34° F. reduces the temperature from 65° F. to 38° F. To cool 15 tons of spring cabbage per day from a field temperature of 75° F. to 38° F. would require a 10 h.p. refrigeration unit.

2134. Clément, A.
La conservation des légumes. (**Storage of vegetables.**)
Jardins Fr., 1959, **5**: 182-7, illus.

Winter storage methods are described and illustrated, including protection of plants *in situ* and storage in frames, trenches, cellars, clamps and lofts.

2135. Chroboczek, E., Kępkova, A., and Święcicki, S.
Badania nad przechowaniem w chłodni kilku gatunków warzyw, wyjętych w kwietniu z kopców. (**Studies on the behaviour of vegetables in cold storage after removal from clamps in April.**) [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1959, **80**: 1-22, bibl. 10.

In 1955 and 1956 vegetables removed from clamps or common storage were placed in cold storage. These included carrots, celeriac and parsley grown as a root crop. Amager and Chantenay carrots stored at 0–2° C. until mid-June showed only 10% loss of marketable produce and less than a further 5% when kept for 7 days after removal from the store. Both appearance and quality were good, the two varieties containing 6·66 and 4·01% sugar and 16·06 and 12·28 mg.% carotene respectively. Roots of the parsley variety Berliner and of the celeriac Alabaster gave similar results. The onion variety Wolska showed a storage loss of only 6·5% when kept at −1 to 3° C. until August 19, but leeks did not store satisfactorily at −2 to +2° C., nor did roots of the parsley variety Cukrowa.

2136. Behrmann, H. I., and Kassier, W. E.
Seasonal variations in the prices of vegetables.
Bull. S. Afr. Dep. Agric. **370**, 1959, pp. 14, bibl. 3, 3s. 3d.

Graphs and notes based on averages of 17 years.

2137. Gane, R., and Wager, H. G.
Plant structure and dehydration.
Food Invest. Mem. D.S.I.R. **1214**, reprinted from *Fundamental Aspects of the Dehydration of Foodstuffs*, 1958, pp. 7.

The effects of dehydration on plant tissues are explained, and the problems associated with the pre-drying treatment required to preserve the flavour and character of desiccated vegetables are discussed with particular reference to cabbages, carrots and potatoes.—Low Temp. Stat., Univ. Cambridge, and D.S.I.R.

Artichokes.

(*See also* 1566.)

2138. Prota, R.
Ricerche sull'entomofauna del carciofo (*Cynara cardunculus* v. *scolymus* L.). II. *Lasioderma baudii* Schils. (Coleoptera, Anobiidae). **(Studies on the insect fauna of the globe artichoke. II. *Lasioderma baudii*.**
Stud. sassar., Sez. III, 1958, 1959, **6**: 210-55, bibl. 23, illus.

The pest can be controlled by dusting the young heads thoroughly with organic chloro derivatives or by enclosing them in muslin bags. Those Compositae which are alternative hosts should be destroyed.

Asparagus.

2139. Plumier, W.
Quelques problèmes de l'amélioration de l'asperge. **(Some problems in asparagus breeding.)**
Bull. hort. Liège, 1960, **15**: 35-8, bibl. 1.

A review, emphasizing sex inheritance.

2140. Harris, W. B., and Rogers, I. S.
Asparagus responds well to nitrogen. Final report on asparagus trial at Berri Experimental Orchard.
J. Agric. S. Aust., 1959, **62**: 329-30.

In the Upper Murray irrigation areas, variety "500" produced much higher yields per acre than Mary Washington. Being more vigorous, it showed a greater response to increased dressings of N. On 2 sandy loam soils increasing the annual dressing of sulphate of ammonia from 2 cwt. to 5 cwt. per acre greatly increased the yield of variety "500". Annual dressings of 5 cwt. superphosphate per acre supplied sufficient P. Potash appeared to be unnecessary.

2141. Hyde, R. B., and Shewfelt, A. L.
Composition of asparagus as influenced by spear length and spear portion.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 26-7.

Fibre, ascorbic acid, moisture and soluble solids contents of different lengths and portions (tip, centre and butt) are tabulated. The greatest variation occurred within the different portions of the spear, the largest being in the ascorbic acid content, which was 2·5 times greater in the tip than in the butt.

Brassicas.

(*See also* 1555, 2133, 2228, 2534, 3029.)

2142. Ogarkova, F. V.
Cabbage growing without transplanting with the aid of paper mulch. [Russian.]
Bjull. nauč. tehn. Inf. n.-i. In-ta Ovoščn. H-va, 1957, No. 3, pp. 24-6, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 72,978.

Sowing seeds of 4 cabbage varieties in bands into perforations in a paper mulch gave yield increases of 7 to 23%, whereas direct sowing into unprotected soil showed no advantage over the transplanting method. The direct-sown, mulched plants were more vigorous and headed earlier than the transplants.

2143. Vinnik, A. G.
The root systems of cabbage seedlings in relation to the method of raising. [Russian.]
Sad i Ogorod, 1959, No. 12, pp. 16-18, illus.

Shoot and root development of container-grown cabbage seedlings, which had been pricked out at the cotyledon stage, was much poorer in plants 35, 42, 46 and 53 days' old than in undisturbed seedlings of similar ages. In 35-day-old plants the dry weights of shoots and of roots were 8·5 times and twice as great, and in 53-day-old plants they were 4 times and 3 times as great, as in transplanted seedlings.

2144. Burleson, C. A.
The relative efficiency of liquid and solid forms of fertilizers as indicated by the growth response of cabbage.
J. Rio Grande Valley hort. Soc., 1959, **13**: 145-8, bibl. 1.

Yields of marketable cabbages from plots with closely spaced plants (1 ft. × 1 ft.) showed increases of approximately 20–30% when N was applied at 120 lb. per acre. The sources comprised ammonium nitrate broadcast or banded dry, or applied dissolved in irrigation water, and anhydrous ammonia, which was banded in the soil or applied in the irrigation water. Yield differences and size distribution from the various treatments were not significant, and banding did not show the expected advantage over the other application methods. The addition of 60 lb. of P_2O_5 per acre did not increase the response to any N treatment. [For earlier trials see *H.A.*, 28: 3651.]—Texas agric. Exp. Stat., Weslaco.

2145. VIHTENKO, I. I.
The effectiveness of fertilizers on cabbage plants irrigated with subterranean water in the conditions of the Donbas region. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 4, pp. 235-40.

The largest yields of cabbages irrigated with subterranean water, from wells or mines, were obtained when superphosphate, alone or with humus, was applied in the hole at the time of planting and when nitrogen was applied 30–60 days after planting. Sodium and ammonium nitrates, when applied in the planting holes at the rate of 15–30 kg. N per hectare, decreased yields. Potassium fertilizers gave no response.

2146. BIZINA, G. S.
Experiments aimed at producing high yields of cabbage seed. [Russian.]
Sad i Ogorod, 1959, No. 9, pp. 18-20.

Cabbage plants were taken from their winter storage clamp in March and laid in small piles in loose soil for 20 days. During this period they received 2 applications of a fertilizer solution (containing N and P) to stimulate root activity. Fertilizing after planting with organo-mineral mixtures and with B and Mn and also irrigation all increased yields of seeds.

2147. CHATTERJEE, S. S., AND MUKHERJEE, S. K.
Studies on vegetables in West Bengal. II. Seed-raising of cabbage (*Brassica oleracea* var. *capitata*).
Indian J. Hort., 1957, **14**: 151-62, bibl. 8, illus., [received 1959].

At Kalimpong (4,000 ft.) in the Eastern Himalayas seed production by the head incision method (2 vertical cuts at right angles, without injuring the central bud) was not very successful. Seed production from decapitated stumps was satisfactory, and Eclipse Drumhead and English Ball produced about 2·5 oz. seeds per plant (about 600 lb. per acre). Seed raised at Kalimpong has produced good cabbages. It proved better to transplant cabbages in August and September than later in the year.—Hort. Res. Stat., Krishnagar, Nadia, W. Bengal.

2148. VLASOV, JU. I.
Mosaic disease of cabbage. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(8): 43-4.

In Uzbekistan, and suggested control measures.

2149. MATTHEWS, R. E. F., AND LYTTLETON, J. W.
Heat inactivation of turnip yellow mosaic virus *in vivo*.
Virology, 1959, **9**: 332-42, bibl. 12.

In Chinese cabbage plants inoculated with TYMV and held at 33° C.

2150. MAZUNINA, V. I.
The effect of actinomycetes antagonistic to the causal agent of bacteriosis of cabbage. [Russian.]
Tr. Inst. Mikrobiol. Virusol. Kaz. SSR., 1959, **3**: 156-61, bibl. 9.

Treating the roots of young cabbage seedlings with a suspension of Strain 1618 of *Actinomyces longisporus* decreased the incidence of bacteriosis caused by *Bacterium carotovorum* [*Erwinia carotovora*] by 8% and increased yields by 11%. When the treatment was applied during head formation, the disease decreased by 28% and the yield increased by 21%. Treating infected cabbage seeds with the same suspension for 20 hr. decreased infection by 64% and for 8 hr. by 40%.

2151. STALDER, L., AND NIKLAUS, L.
Eine für die Schweiz neue Krankheit an Kohlgewächsen. **(A disease of the cabbage family new to Switzerland.)**
Reprinted from *Gemüseb.*, 1959, No. 1, pp. 3-8, bibl. 7, illus.

Good control of black leg of cabbage (*Phoma lingam*) was achieved by hot-water treatment of seeds at 50° C. for 20–25 minutes. A wet seed dressing of 0·25–0·5% Ceretan for 30 minutes is also recommended, though with less assurance. Cultural measures promoting the growth of the plants tended to reduce the damage.—Eidg. Versuchsanst., Wädenswil.

2152. KEYWORTH, W. S.
Wirestem of brassica seedlings caused by *Rhizoctonia solani*.
From abstr. in *Trans. Brit. mycol. Soc.*, 1959, **42**: 398.

Pentachloronitrobenzene, either as a 20% powder or a 75% w.p. suspension, gave as good control as mercuric chloride and without its phytotoxicity.

2153. STEINHAUER, A. L., DITMAN, L. P., AND WILEY, R. C.
Insecticidal control of insects infesting broccoli and cabbage.
J. econ. Ent., 1959, **52**: 816-18, bibl. 1.

Spray applications were made at weekly intervals for the control of the cabbage looper (*Trichoplusia ni*), the imported cabbage worm (*Pieris rapae*), and the cabbage aphid (*Brevicoryne brassicae*) on broccoli and cabbage. The most promising against all 3 pests were dimethoate and malathion alone or in combination with Perthane or toxaphene. Perthane-Diazinon, Dibrom, thiodan and Trithion-Perthane also gave good protection to broccoli. The other materials tested controlled some, but not all the 3 insects. All the materials caused temporary burning of broccoli.—Md agric. Exp. Stat., College Park.

2154. HALL, I. M., AND ANDRES, L. A.
Field evaluation of commercially produced *Bacillus thuringiensis* Berliner used for control of lepidopterous larvae on crucifers.
J. econ. Ent., 1959, **52**: 877-80, bibl. 2.

Commercially produced samples of spore material of *Bacillus thuringiensis* Berliner were tested in sprays and dusts on cauliflower and cabbage plants for control of cruciferous insects. With coverage an important factor, dusts appeared to be better than sprays. No control of the beet armyworm, *Laphygma exigua*, was obtained. For at least 80% kill of the cabbage looper, *Trichoplusia ni*, and of the imported cabbageworm, *Pieris rapae*, minimum dosage of 25 × 10^{12} spores per acre was required. However, it is likely that higher dosage levels of up to 68 × 10^{12} spores per acre may be necessary for insect control in some situations. The materials were rather short lived on the plants and lost their effect after 5 to 10 days. [Authors' abstract.]—Univ. Calif., Riverside.

155. UGOLINI, A.
La cavolaia. (**Cabbage butterflies.**)
Inf. fitopat., 1959, **9**: 254-6, illus.

Control of *Pieris brassicae* by arsenates, rotenone and *Bacillus thuringiensis*.

156. SCHUSTER, M. F.
Field tests of insecticidal dusts for control of the cabbage looper.
J. Rio Grande Valley hort. Soc., 1959, **13**: 156-8, bibl. 3.

ffective control of the cabbage looper (*Trichoplusia i*) was achieved with 20% toxaphene, 10% Sevin, 0% malathion + 20% toxaphene, 72% cryolite, 0% cryolite + 15% DDT, and 2% Phosdrin, all pplied as dust formulations.—Texas agric. Exp. tat., Weslaco.

157. (HIBBS, E. T.)
Heptachlor controls thrips in cabbage.
Ia Fm Sci., 1959, **14**: 301, illus.

n 3 years' trials heptachlor at ½ lb. per acre, when dded to Phosdrin, DDT or parathion, adequately ontrolled onion thrips on cabbage if weekly or ortnightly spraying began at heading [see also *.A.*, 29: 2446]. The imported cabbageworm and e diamondback moth were adequately controlled y ½ lb. Phosdrin, ¼ lb. endrin, ½ lb. Dibrom or lb. DDT per acre. The cabbage looper was ontrolled by ¼ lb. endrin, ½ lb. Phosdrin, 1 lb. iodan, ½ lb. parathion, ½ lb. Dibrom or 1 lb. DDT er acre in weekly applications.

58. FRÖHLICH, H., AND HENKEL, A.
Die Lagerung von Chinakohl. (**The storage of Chinese cabbage.**)
Dtsch. Gartenb., 1959, **6**: 245-8, bibl. 1, illus.

hinese cabbages were successfully stored for rious periods up to the end of December in frames, amps and ditches covered with mats. Firm and large heads only were found suitable for storage. To prevent rots spreading the cabbages should be examined once a fortnight.—Inst. f. Gartenb., Grossbeeren.

2159. CLAPP, R. C., AND OTHERS.
The volatile isothiocyanates in fresh cabbage.
J. Amer. chem. Soc., 1959, **81**: 6278-81, bibl. 18.

Four thioureas identified.

2160. ALTAMURA, M. R., LONG, L., JR., AND HASSELSTROM, T.
Goitrin from fresh cabbage.
J. biol. Chem., 1959, **234**: 1847-9, bibl. 14.

Small amounts of this strongly anti-thyroid substance identified in leaves.

2161. PENTAYITES, A.
The cultivation of the cauliflower.
Countryman, Nicosia, July-August, 1959, pp. 19-21.

Varieties, culture, diseases and pests in Cyprus.

2162. HAHN, P.
Der Einfluss des "Überständigwerdens" auf Ertrag und Sortierung bei Früh- und Herbstblumenkohl. (**The effect of growth checks on yield and quality in early and late cauliflowers.**) [English summary 10 lines.]
Arch. Gartenb., 1959, **7**: 308-13.

Growth checks at early stages proved very detrimental to yield and quality. It is recommended that greater care should be taken in selecting suitable varieties and in so treating the young plants as to avoid the occurrence of such checks. Varieties suitable for Berlin conditions are named. —Zentralstelle f. Sortenwesen, Berlin.

2163. NOLL, J., AND GOTTSCHLING, W.
Bekämpfung der durch Molybdänmangel verursachten Herzlosigkeit an Blumenkohl. (**The control of whiptail in cauliflower due to molybdenum deficiency.**) [English summary 25 lines.]
NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 169-72, bibl. 6.

German trials in recent years show that the provision of ample nutrients including trace elements in the soil, annual liming and good cultivation are the best means of preventing whiptail. If it occurs, its results can be abated by the addition of sodium molybdate or Ruscalin Sp to the soil. Tests of 20 varieties showed that there is a great difference in susceptibility between varieties, 2 proving much less susceptible, and 4 much more susceptible, than the others.—Dtsch. Akad. LandwirtsWiss. Berlin.

2164. HOFMASTER, R. N.
Effectiveness of new insecticides against the harlequin cabbage bug on collards.
J. econ. Ent., 1959, **52**: 777-8, bibl. 1.

In the experiments described, several insecticides were found to be effective against both nymphs and adults of the harlequin cabbage bug, *Murgantia histrionica*, on kale. Sevin and Thiodan were especially rapid in action. Trithion and Dylox acted more slowly but eventually gave excellent control. A combination of parathion and toxaphene produced better results than either chemical applied separately; this mixture is also used with success against other pests of brassicas.—Va Truck Exp. Stat., Painter.

2165. LUCAS, H. L., AND OTHERS.
Influence of environment on the chemical composition of plants. 3. Relations of the composition of turnip greens to soil and weather factors.
South. coop. Ser. Bull. **52**,* 1959, pp. 92, bibl. 7.

Turnip greens were grown in not less than 2 seasons of the year for one or more years at 9 places in the S.E. region of the U.S.A. and one in Puerto Rico, both in the field and in open air sand cultures. From 4 to 12 harvests were obtained from each crop, and these were analysed for dry matter, crude fibre, ascorbic acid, N, riboflavin, thiamine, carotene, ether extract, P, Ca, K, Mg, Fe, and Na. Weather conditions, including soil temperature and moisture, were recorded and soil properties examined. The relationships between plant constituents, weather factors and soil conditions are set out in tabular form and summarized, and the following are among the general conclusions reached: Weather factors and the age of the plants appeared to exercise a greater influence on the organic constituents of the leaf than did soil properties, whereas all 3 factors were equally important with regard to inorganic composition. It is considered that certain constituents, such as crude fibre, are such integral parts of the plant that little variation is permissible (the maximum found being 11%), whereas others, such as Na and Fe, can vary widely under environmental stimuli. The plants in sand cultures made less initial growth but caught up the field-grown crops by harvest time. Ageing effects were more marked in the field plants. There was also a tendency for the weather effects to weaken as the plants aged. Methods for improving techniques in future experiments are discussed.

2166. LLOYD, A. B.
The transmission of *Phoma lingam* (Tode) Desm. in the seeds of swede, turnip, chou moellier, rape, and kale.
N.Z. J. agric. Res., 1959, **2**: 649-58, bibl. 11, illus.

Details of a technique for detecting seed-borne infection in brassicas are given. Of 263 seed samples tested in a 2-year survey 223 were free from infection. Approximately half of the infected seeds did not germinate. In stored seeds the fungus remained viable for 14 months. However, the importance of seed-borne infection for primary spread of the pathogen is not supported by the experimental evidence, and air-borne infection is suggested.—Seed Testing Stat., Palmerston North, N.Z.

2167. GRAINGER, J.
Disease control through intimate mixing of mercuric oxide with soil.
Phytopathology, 1959, **49**: 627-33, bibl. 8, illus.

Control of *Plasmodiophora brassicae* was obtained using 13 cu. ft. per acre of a dust containing 5 lb. of mercury equivalent as yellow oxide of mercury. Intimate soil admixture was achieved by delivering the dust on the surface and at 7 in. depth, and subsequently mixing the top 9 in. of soil using a rotavator. With turnips and swedes 95–98% control of club-root was obtained. With the swede variety Best of All the treatment increased the yield from 12·6 to 20·3 tons per acre.—W. Scot. agric. Coll., Ayr.

2168. SWAILES, G. E.
Resistance in rutabagas to the cabbage maggot, *Hylemya brassicae* (Bouché) (Diptera: Anthomyiidae).
Canad. Ent., 1959, **91**: 700-3, bibl. 2.

Resistance to the establishment and development of cabbage root fly larvae was shown in the highest degree by Wilhelmsburger swedes, whereas the fast growing Ditmars Bronze Top was the most susceptible to larval attack.—Canada agric. Res. Stat., Lethbridge, Alberta.

2169. HARDING, J. A.
The control of turnip aphids and flea beetles with Di-Syston and Thimet.
J. Rio Grande Valley hort. Soc., 1959, **13**: 159-60, bibl. 1.

Both insecticides at 1 and 2 lb. per acre reduced the damage done to turnips by *Rhopalosiphum pseudobrassicae* and *Phyllotreta pusilla*, but only Thimet at 2 lb. per acre gave a commercial level of control.—Winter Garden Exp. Stat., Crystal City, Texas.

Celery and celeriac.

(*See also* 2258.)

2170. BRENCHLEY, G. H.
The hot-water treatment of celery seed.
Comm. Gr, 1960, No. 3339, pp. 28-9, illus.
Do your own hot-water treatment.
Grower, 1960, **53**: 27-9, illus.

Detailed directions are given to growers for treating their own celery seed for control of leaf spot (*Septoria* spp.) by immersion in hot water at 122° F. for 25 minutes. The method is cheap, easy and reliable.

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* This bulletin in the series is obtainable from N. C. agric. Exp. Stat., Raleigh.

2171. Govi, G.
Avversità delle colture orticole. Sedano. **(Pests and diseases of vegetables. Celery.)**
Progr. agric., 1959, **5**: 1416-17, illus.

Including brief notes on the control of the moth *Schistodepressaria nervosa*, the fly *Philophylla heraclei*, mole-crickets (*Gryllotalpa* spp.), leaf spot (*Septoria apii*), collar rot (*Sclerotinia sclerotiorum*) and mosaic virus.

2172. Grigarick, A. A., and Tanada, Y.
A field test for the control of *Trichoplusia ni* (Hbn.) on celery with several insecticides and *Bacillus thuringiensis* Berliner.
J. econ. Ent., 1959, **52**: 1013-14, bibl. 3.

Two dust combinations, malathion + Perthane and DDT + toxaphene + sulphur (presence ncidental) gave the best control of cabbage looper on celery. Thiodan, *B. thuringiensis*, parathion and Phosdrin dusts were somewhat less effective, though *B. thuringiensis* compared favourably with the 2 insecticide combinations against the third- to ifth-instar larvae.—Univ. Calif., Davis.

173. Anon.
Prototype celery washer.
Produce Packaging, 1959, **5**(10): 23.

Capable of washing 2,500–3,000 sticks an hour.

174. Blondin, P.
L'influence de l'écartement dans la culture du céleri-pomme. **(The effect of spacing in celeriac cultivation.)**
Rev. hort. suisse, 1960, **33**: 57-61.

pacings rising 1 cm. at a time from 17 to 35 cm. were compared for 7 varieties of celeriac, with the ows in every case 60 cm. apart. For the 7 varieties ombined, 21 cm. gave the highest yield of 382 kg./re, with an average "root" weight of 427 g., hereas 32 cm. gave the heaviest "roots", but a eld of only 327 kg./are. Data are recorded for ach variety, and these show in each case an explicable drop in yield below the average for e variety at some spacing between 24 and 27 cm. For earlier work see *H.A.*, 29: 2522.]

175. Böhme, H.
Über die Ursachen der unterschiedlichen Resistenz von zwei verschiedenen Knollenselleriesorten gegenüber der Blattfleckrankheit (*Septoria apii-graveolentis* Dorogin). **(The causes of variability in the resistance of two varieties of celeriac to celery leaf spot.)** [English summary ¾ p.]
Phytopath. Z., 1959, **37**: 195-213, bibl. 69, illus.

e development of *Septoria apii-graveolentis* was mpared in a resistant (Wiener Markt) and in a sceptible (Invicta) variety. The intensity of uctification of the fungus in the leaf was greater in Invicta than in Wiener Markt, and thus may be used for the quantitative determination of varietal susceptibility. Young plants of both varieties were more susceptible to artificial infection than older plants. Mycelial development is inhibited in the leaves of Wiener Markt, although spore germination and hyphal penetration occurred at an equal rate in both varieties. Wiener Markt, though resistant to the Quedlinburg strain of *Septoria*, was susceptible to *Septoria* strains from Italy.—Inst. PflZucht., Quedlinburg.

Cucurbits.

(*See also* 1510, 1545, 1546, 1563, 1962, 2106, 2657.)

2176. Skillman, E. E.
Cucumber production in the light of recent research.
Comm. Gr, 1960, No. 3341, p. 131.

Preliminary results reported of experiments at the Hoddesdon Experimental Station on cucumber composts, size of beds, and hose *versus* automatic watering.

2177. Stuckman, N. W.
Michigan pickling cucumbers—the grower, the picker and the WYRF [worker yield return formula].
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 2-23.

An economic study of the causes of low yields, returns and wages.

2178. Semenko, A. M.
Improvement of the cucumber variety Muromsk. [Russian.]
Agrobiologija, 1959, No. 4, pp. 519-26, bibl. 5.

By careful selection of seed substantial increases in yields were achieved. Climate and geographical region of production influenced seed quality, and it is suggested that seed obtained in years of favourable weather conditions should be stored for use in years when only lower quality seed would otherwise be available.

2179. Astaf'ev, N. N., Pičak, V. A., and Mahan'ko, A. A.
Raising seedlings under luminescent lamps. [Russian.]
Sad i Ogorod, 1959, No. 11, pp. 23-5, illus.

Cucumber and tomato seedlings, in a heated greenhouse, illuminated for 12–15 days by artificial light (6,000–7,000 lux) produced heavier cropping plants than seedlings raised in natural light. Illumination for 16–18 hours a day gave best results.

2180. Spiridonova, A. I., and Vaščenko, S. F.
Cultivating cucumbers and tomatoes on artificial media. [Russian.]
Sad i Ogorod, 1959, No. 9, pp. 23-9.

Glasshouse crops grown successfully in gravel and brick chippings with nutrient solutions.

2181. Asselbergs, E. A., Mohr, W., and Wethington, E.
Colour improvement of close planted pickling cucumbers.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958, 1959*, pp. 23-4.

The yield of close planted, 1 ft. × 6 in., cucumbers compared favourably with that of regular 5 ft. × 6 in. planting, but the fruit had insufficient green colour for use in pickles. An attempt was made to improve green colour by applying the following sprays: (a) 0·2% solutions of $MnSO_4$, or $CuSO_4$, (b) a combination of Mn, Mg and Cu sprays in the same concentration, (c) 1% urea solution and (d) niagarathol defoliant applied 4 days prior to harvest. Treatments (a)–(c) were applied 5 times during the season starting immediately after the first flowers appeared. None of the substances tried proved beneficial.

2182. Kuykendall, R.
Coastal plain research projects. Annual Report of Branch Experiment Station, Newton.
Miss. Fm Res., 1959, **22**(9): 3.

Cucumbers: The highest yield was from 1 ft. spacing, irrespective of fertilizer treatment; of the latter 16 lb. N per acre was optimal over a 7-year period, and higher rates of N depressed yields. *Sugar cane:* Over 8 years yields of C.P.29/116 and C.P.36/111 were about equal, but C.P.36/111 is recommended for syrup production since crystallization is less severe.

2183. Galun, E.
Effects of gibberellic acid and naphthalene-acetic acid on sex expression and some morphological characters in the cucumber plant.
Phyton, 1959, **13**: 1-8, bibl. 9.

Gibberellic acid solutions of 1–100 p.p.m., when applied to young leaves of cucumber plants, induced a marked change towards maleness. This change could be induced in both normal monoecious plants and also in plants producing only female flowers very early in ontogeny. GA initially stimulated internode elongation, but continuous application resulted in reduced internode length. Leaf size was unaffected at first, but later it was also reduced. The effects on sex expression, however, did not decrease with continued treatment. NAA reduced leaf size and petiole length and the addition of GA tended to reverse this effect.—Weizmann Inst. Sci., Rehovot.

2184. Matta, A.
Avvizzimento fisiologico dei frutti di cetriolo. (**Physiological withering of cucumber fruits.**)
Inf. fitopat., 1959, **9**: 372-3, illus.

Attributed to serious disturbance of the water balance by unstable or adverse climatic conditions in glasshouses, particularly overheating and excessive light intensity.

2185. van Koot, Y., and van Dorst, H. J. M.
Virusziekten van de komkommer in Nederland. (**Virus diseases of cucumber in the Netherlands.**) [English summary ½ p.]
Tijdschr. PlZiekt., 1959, **65**: 257-71, bibl. 17, illus.

Symptoms, properties, spread and possibilities of prevention or control of *Cucumis* viruses 1, 2 and 2A and cucumber necrosis virus.

2186. Jackson, C. R.
Symptoms and host-parasite relations of the *Alternaria* leafspot disease of cucurbits.
Phytopathology, 1959, **49**: 731-3, bibl. 10.

And factors influencing infection and spread.

2187. Nelen, E. S.
An effective preparation against mildew. [Russian.]
Zaščita Rast. Vredit. Bolez., 1958, No. 1, p. 42, from *Ref. Ž. (Biol.)*, 1958, No. 16, Abstr. 73,322.

On cucumbers good control was obtained with Phygon at 200 g. in 100 l. water applied 3 times at 10-day intervals.

2188. Stout, B. A., and Ries, S. K.
A progress report on the development of a mechanical cucumber harvester.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 699-718, illus.

Five harvesters and 2 vine trainers have been tested, and their performance is reported. A major problem was the inability of the machines to harvest fruit set within 6 in. of the base of the plant, but gibberellic acid at 100 and 250 p.p.m., applied at the 2–4-leaf stage, helped (though not consistently) to prevent pistillate flowers developing near the base of the plant. Oats planted in the row were useful markers for following the row. Yields were reduced by wide spacing between the rows, and this was not overcome by closer planting in the row. A harvester is needed which can cope with rows as close as 40 in.

2189. Narayana, K. L., Rangarao, P. V., and Anjaneyulu, C. V.
The cucurbit fly (*Dacus cucurbitae* Coq.) in the Northern Circars and its control.
Indian J. Hort., 1957, **14**: 163-8, bibl. 9, [received 1959].

Dacus cucurbitae on bitter gourd (*Momordica charantia*) was most successfully controlled by sprays of 0·03% endrin. Aldrin, lindane and dieldrin were less effective, but the flies were significantly reduced in comparison with the controls.—Dep. Agric., Andhra.

2190. Hyams, E.

Melons: the second year.

Gdnrs' Chron., 1959, **146**: 217, 226, 228, illus.

Further observations on many foreign varieties grown under cloches in England [see also *H.A.*, 29: 1552k].

2191. Lu, C.-S., and Wang, P.-H.

Studies on the carbohydrate metabolism of Bai-lan melons. I. The accumulation of sugars and ascorbic acids during fruit developments and ripening periods. [Chinese, with English summary ¾ p.]

Acta bot. sin., 1959, **8**: 221-9, bibl. 14.

The total sugar and starch content of melon fruits rose steadily throughout the growing period and increased markedly during ripening until the sugar content reached 6·68–8·07% of the fresh weight at maturity. During the early developmental stages reducing sugars increased, whereas sucrose was insignificant. After 30 days of fruit development the proportions were reversed, and at maturity sucrose comprised more than 70% of the total sugars. Glucose and fructose concentrations paralleled those of the reducing sugars. The ascorbic acid concentration decreased from the beginning of fruit development until about 30 days after blossoming and then increased rapidly until maturity.—Univ. Lanchow.

2192. N.S.W. Department of Agriculture, Biological Branch.

Fusarium wilts and footrot of cucurbits.

Agric. Gaz. N.S.W., 1959, **70**: 310-11, illus.

The symptoms and distribution of the diseases caused by *Fusarium oxysporum* f. *niveum* on watermelon, *F. oxysporum* f. *melonis* on rockmelon, and *F. solani* f. *cucurbitae* on pumpkin, squash and marrow are described briefly. Control is by the use of disease-resistant varieties where available, seed selection, crop rotation, and the planting of seed in small pots which allows infected seedlings to be detected and destroyed.

93. ter Laak, P. J.

Welke mogelijkheden biedt chemische grondontsmetting tegen de verwelkingsziekte bij meloenen? **(Soil fumigation with chemicals for control of melon wilt.)**

Cult. Hand., 1959, **25**: 399-400.

n soil heavily infected with melon wilt (*Fusarium* d *Verticillium* spp.), fumigation with Vapam sulted in much better growth and higher yields melons than fumigation with formalin. Wilt veloped later in the season and was much less vere. The higher of 2 rates of Vapam tested ·4 l. per RR [= 14·19 sq. m.]) gave the best ntrol of wilt. The untreated control plants made or growth and died after fruit set.

2194. Oatman, E. R.

Natural control studies of the melon leaf miner, *Liriomyza pictella* (Thomson).

J. econ. Ent., 1959, **52**: 895-8, bibl. 11.

The melon leaf miner is heavily parasitized, mainly by *Solenotus begini* and *Halticoptera aenea*. Parasitism increased as the crop matured. A close correlation was noted between the numbers of the leaf miner and its parasites, except during the middle of the growing season, when the population of leaf miners greatly exceeded that of the parasites. DDT and parathion depressed the populations of both the leaf miner and its parasites, but had less residual effect on the former.—Univ. Wis., Madison.

2195. Kirkpatrick, M. E., Brogdon, J. L., and Matthews, R. H.

Flavor of cantaloups as affected by treatment with lindane.

J. agric. Food Chem., 1960, **8**: 57-8, bibl. 4.

Melons treated with 0·35 lb. lindane per acre, either as a dust, wettable powder or emulsion, were compared with untreated controls. Four applications were made at weekly intervals, the last one a day prior to harvesting. Palatability evaluations indicated that as a dust lindane did not affect flavour, as a wettable powder it slightly affected it and as an emulsion it adversely affected flavour and also aroma.—Human Nutrit. Res. Div., U.S.D.A., Washington, D.C.

2196. Kokuškina-Savel'eva, R. P.

The development of aerial and underground organs of squash planted in groups. [Russian.]

Uč. Zap. Saratovsk. gos. ped. In-t, 1957, No. 27, pp. 173-201, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,702.

The squash varieties Mozoleevskaja (*Cucurbita pepo*) and Seraja Volžskaja (*C. maxima*) were grown in groups of 1, 2 and 3 plants on areas of 3 and 6 sq. m., i.e. spaced 2 × 1·5 and 3 × 2 m. At relatively high densities (1–2 sq. m. per plant) the growth of the main stem and the formation of laterals were somewhat retarded and the horizontal branch roots began to die off earlier than at lower planting densities. The roots of grouped plants penetrated more deeply, which resulted in a greater water uptake and higher yields per unit area. The highest yields were obtained from group planting 2 × 1·5 m. apart with 3 plants of the variety Mozoleevskaja (229 centners/ha.) and 2 plants of Seraja Volžskaja (210 centners/ha.) compared with single plants at 2 × 1·5 m., which yielded 149 and 136 centners/ha., respectively.

2197. Walker, P.

Courgettes. Avoid exposed positions.

Grower, 1960, 53: 127.

Courgettes are vegetable marrows which are harvested young, not exceeding 6–7 in. long, and are intended to be cooked whole. Suitable varieties for courgette production are Italian Vegetable Marrow, Cocozelle and Zucchini types. Long Green Trailing is also suitable but matures later. Cultivation is the same as for ordinary marrows, but exposed positions should be avoided and careful harvesting and packing are necessary as the fruits are tender. The yield of young marrows is high and continues for a long period.

Legumes—beans.

(*See also* 1510, 1533, 1534, 1536, 1539, 1544, 1554, 1564, 1569, 1904, 1962, 1973, 2227, 2231, 2235, 2243, 2318, 3048.)

2198. Colombia, Ministerio de Agricultura.
Oficina de Investigaciones Especiales. Septimo Informe Anual, Mayo 1° de 1956–Abril 30 de 1957. **(Seventh Annual Report May 1956-April 1957, of the Department for Specialized Research, Ministry of Agriculture.)**
Rev. nac. Agric. Bogotá, 1959, **53**(646): 3–91, illus.

The report includes the results of bean variety trials carried out to select varieties resistant to drought, leaf spot (*Cercospora canescens*), anthracnose (*Colletotrichum lindemuthianum*) and angular leaf spot (*Isariopsis griseola*). With raised beds 60–90 cm. wide, the most productive sowing rate was 2 rows per 90-cm. bed, followed fairly closely by 3 rows per 90-cm. bed.

2199. Chipman, E. W., and Hope, G. W.
Variety trials for canned products.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 36-7.

Tomatoes: Scotia ranked first on colour, flavour, shape retention and general appearance. Its ascorbic acid content was 19·5 mg./100 g. *Beans:* Tendercrop, Royalty and Pearl Green were the best green bush varieties, Blue Lakes 92 and Blue Lakes (Ferry Morse 1) the best green pole, and Golden Lake and Golden Chester the best pole wax beans tested. As frozen products Garden Green was the most suitable green bush, Golden Lake the best pole wax, and Blue Lakes (Ferry Morse) the most attractive green pole bean. *Apples:* Preliminary tests have shown Crandall and 33-125-70 to produce excellent canned sauce and solid packs.—Res. Stat., Kentville, N.S.

2200. Olave L., C. A.
Resistencia de algunas variedades y líneas de fríjol (*Phaseolus vulgaris* L.) al *Isariopsis griseola* Sacc. **(Resistance of some varieties and lines of beans (*Phaseolus vulgaris*) to *Isariopsis griseola*.)** [English summary ½ p.]
Acta agron. Palmira, 1958, **8**: 197-219, bibl. 32, illus.

The only Colombian variety of bean with very good resistance to angular leaf spot was Cauca 27a, which was rated with México 11 and México 12. The remaining 9 varieties tested were classified in 4 categories ranging from resistant to highly susceptible. The control measures recommended include spraying with a mixture of ferbam, sulphur and a sticker, or, failing that, with 4–4–50 bordeaux mixture.

2201. Vukasović, P.
Opažanja o polifagiji pasuljevog žiška (*Acanthoscelides obtectus* Say). **(Observations on the host range of the bean weevil (*A. obtectus*).)** [French summary 2 pp.]
Arh. poljopr. Nauk., 1959, **12**(36): 31-44, bibl. 12.

No significant difference found in the susceptibility of 10 bean varieties.

2202. Vargas S., R., and Brown V., L.
Producción de semilla seleccionada de frijol, campaña 1958. **(Production of selected seed of beans, season 1958.)**
Inf. mens. La Molina, 1959, **33**(379): 1-9, bibl. 2, illus.

Trials leading to recommendation of the strain California LM56 for certain areas in Peru. [For earlier results see *H.A.*, 28: 3681.]

2203. Vieira, C.
Rico-23, nova variedade de feijão prêto para a zona da Mata, Minas Gerais. **(Rico-23, a new black bean variety for the Mata region of Minas Gerais [Brazil].)**
Rev. Ceres, 1959, **11**(61): 22-6, bibl. 5, illus.

A black-seeded strain of *Phaseolus vulgaris* var. *subcompressus*, resistant to anthracnose (*Colletotrichum lindemuthianum*), rust (*Uromyces phaseoli typica*) and to some extent to southern blight (*Sclerotium rolfsii*).

2204. Cruchet, P.
Supports pour haricots ramés. **(Supports for runner beans.)**
Rev. hort. Suisse, 1960, **33**: 26-7, illus.

The Federal Experiment Station at Lausanne has designed a system of supports for runner beans, which is rapid to erect and stands up well to winds. It consists of upright posts, 2 m. 20 cm. high, spaced at 4 m. intervals along the rows. These carry crossbars fitted into special sockets at the tops of the posts. The crossbars are pierced with holes at intervals of 80 cm. through which steel rods are inserted vertically. Three bean plants are trained up each rod.

2205. Märtin, B.
Die Stickstoffdungung der Buschbohne. Ein Beitrag zur Klärung der Frage nach der richtigen Bemessung der Stickstoffdüngung zu der wichtigsten Grossleguminosen.

(Nitrogenous manuring of dwarf beans. A contribution on the problem of manuring the more important large-seeded leguminous crops.) [English summary 5 lines.]
Arch. Gartenb., 1959, **7**: 304-7, bibl. 6.

In 3 years' field trials at the Plant Institute of the University of Jena the application of 200 kg./ha. of a 20% N manure to dwarf beans resulted in substantially increased yields. This is in contrast to results in previous trials with peas, field beans and lupins, where increasing the amounts over about 40 kg./ha. had little effect, and indicates the comparatively poor capacity of the dwarf bean for natural nitrogen fixation.

2206. Biddulph, O., Cory, R., and Biddulph, S.
Translocation of calcium in the bean plant.
Plant Physiol., 1959, **34**: 512-19, bibl. 14, illus.

The instance of greatest Ca mobilization was that from cotyledons during the early growth of root, hypocotyl and primary leaves. The growth of apical meristem and trifoliate leaves was dependent on an external source of Ca since the cotyledonary Ca was not only limited in amount but by then largely immobile. The order of increasing Ca concentration among plant parts was root, stems, trifoliate leaves, and primary leaves—indicating that an important factor in Ca accumulation was the total volume of the transpiration stream received. Also important was the meagre loss following the initial deposition, prohibiting reutilization in growth and metabolism elsewhere. The amount of foliar-applied Ca exported from the leaf was small, approximately only $\frac{1}{100}$ that of P under conditions of maximum percentage translocation. The amount exported from a leaf was related to the amount applied, but not to the nutritional conditions imposed on the plants. Calcium, then, is not immobile in the phloem; it is the volume of flow which is small. Calcium could not be induced to move from a leaf *via* the phloem in extra-ordinary quantities, but movement *via* the xylem occurred following treatment of the leaf with the vapour of diethyl ether. Applying NaCl with the foliar spray or treating the plant with triiodobenzoic acid induced Ca movement in the xylem during the dehydration of the plant. [Authors' summary.]—St. Coll. Wash., Pullman.

2207. Betto, E., Foa, R., and Volpi, A.
L'assorbimento e la traslocazione del P^{32} su piante di *Phaseolus vulgaris* in presenza di glicole polietilenico e dell'acido indolacetico.
(Absorption and translocation of P^{32} by plants of *Phaseolus vulgaris* in the presence of polyethylene glycol and indoleacetic acid.)
Reprinted from *Atti Congr. sci., Sez. nucl. IV. Rass. internaz. Elettron. nucl. Roma 1957*, pp. 351-6.

When a phosphate containing P^{32} was applied to a primary leaf of a bean seedling, its absorption and translocation to the stem and opposite leaf were markedly increased by the addition of 1% polyethylene glycol. The effect was very slightly enhanced by the further addition of IAA at 10 or 20 p.p.m., but not at 100 p.p.m. Translocation to the roots was increased in some instances by polyethylene glycol, but IAA alone did not affect either the absorption or the translocation of P.

2208. Bass, S. T., Hamner, C. L., and Sell, H. M.
Effects of 2,4-dichlorophenoxyacetic acid on the mineral contents of cranberry bean plants (*Phaseolus vulgaris*).
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 43-6, bibl. 17.

A single drop of a 1,200 p.p.m. solution of 2,4-D was applied to the base of the first true leaf. The B and Ca percentages in the leaves were reduced, and those of Cu, K, Mg, Na and P increased. In the stems the Ca content fell, as did those of Fe, K and Mg, whereas contents of B, Cu, Mn, Na and P rose. The roots showed large increases in B, Cu, K and P but smaller amounts of Ca, Fe, Mg, Mn and Na.

2209. Nieman, R. H., and Bernstein, L.
Interactive effects of gibberellic acid and salinity on the growth of beans.
Amer. J. Bot., 1959, **46**: 667-70, bibl. 10.

Dwarf red kidney bean plants, grown from the primary leaf stage to maturity on a graded salt series (0, 1·5, 3·0 and 4·5 atm. O.P. [osmotic pressure] NaCl added to a base nutrient solution), showed a progressive and highly significant growth depression with increasing concentration of NaCl. At low levels of salinity (0 and 1·5 atm. O.P.) gibberellic acid applied as a spray to primary leaves, in concentrations of 10 and 100 p.p.m. in distilled water, increased the stem length, fresh and dry weight of both top and the root, the yield of green beans, area per leaf, and the total leaf area per plant. At high levels of salinity (3·0 and 4·5 atm. O.P.) growth was so severely suppressed that the expression of all gibberellin effects, except the increase in stem length, was essentially prevented. Gibberellin was, therefore, ineffective in overcoming the salt-induced suppression of growth. An increased rate of water use per unit leaf area was quite consistently observed with the gibberellin-treated plants. This may be simply the result of the increased exposure to light and to air movement of leaves on an elongated stem. [Authors' abstract.]—U.S. Salinity Lab., Riverside, Calif.

2210. Nagaich, B. B.
Effect of tomato virus on infection of bean plants by tobacco mosaic virus.
Indian J. agric. Sci., 1958 (issued 1959), **28**: 563-6, bibl. 5.

Inhibition of TMV infection of beans by tomato virus.

2211. ROHLOFF, I.
Einige Hinweise zur praktischen Durchführung der Untersuchung von Bohnensamen auf Brennfleckenbefall. **(Hints on the examination of bean seeds with the object of detecting anthracnose infection.)**
Saatgut-Wirtsch., 1959, **11**: 197-8, bibl. 4, illus.

Special dishes are described in which the individual seeds lie in separate compartments. The beans are germinated at 19–20° C. for 17 days. Then the testa is removed, and the spores of *Colletotrichum lindemuthianum*, which form following infection, are identified microscopically. Filter paper, arranged so that each seed lies in a separate fold, is a more cumbersome alternative to the special germination dish.

2212. ANDRÉN, F., AND OLOFSSON, B.
Bekämpningsförsök mot bönfläcksjuka. **(Experiments on the control of bean anthracnose.)**
Växtskyddsnotiser, 1959, **23**: 3-4, illus.

Treatment of seed from anthracnose-diseased beans should be supplemented by spraying with zineb during the growing season. Two other fungicides proved equally effective against *Colletotrichum lindemuthianum*, but zineb is believed to involve no health risk to the consumer.

2213. SNYDER, W. C., SCHROTH, M. N., AND CHRISTOU, T.
Effect of plant residues on root rot of bean.
Phytopathology, 1959, **49**: 755-6, bibl. 2, illus.

Fusarium solani f. *phaseoli* and, to some extent, *Rhizoctonia* [*Corticium*] *solani* and *Thielaviopsis basicola*, the principal causal agents of bean root rot in the Salinas Valley, were controlled in greenhouse tests by adding to field soil organic amendments of a high C : N ratio. Control was achieved with mature barley straw, wheat straw, corn stover and pine shavings. Mature barley straw gave good control, but green barley hay (with a higher N content) increased the disease severity. The benefits of mature barley straw were negated by adding N. Soya bean and alfalfa residues that have a low C : N ratio increased root rot. [From authors' summary.]—Univ. Calif., Berkeley.

2214. JOHANNES, H.
Zur Frage der Bohnenbeizung mit kombinierten Beizmitteln. **(The problem of bean seed disinfection with fungicide-insecticide mixtures.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1959, **11**: 188-90.

In naturally infected soil seed treatment with TMTD gave an increase of 143% in bean germination, but the similar use of TMTD + dieldrin or of TMTD + aldrin reduced this increase to approximately 100% over the value for untreated seeds. In a sterile medium germination was increased by only 5% by TMTD and was reduced by 7–8% by dieldrin, TMTD + dieldrin or TMTD + aldrin and by 19% by aldrin alone.

2215. DAVEY, C. B., AND PAPAVIZAS, G. C.
Effect of organic soil amendments on the *Rhizoctonia* disease of snap beans.
Agron. J., 1959, **51**: 493-6, bibl. 24, illus.

Mature grain straws gave considerable, but short-lived protection. Leguminous crop residues took much longer to suppress *R. solani.* [See also *H.A.*, 30: 676.]—U.S.D.A., Beltsville, Md.

2216. DONGO, S.
Control de la chupadera fungosa del frijol mediante fungicidas. **(Control of damping-off in beans by the use of fungicides.)**
Inf. mens. La Molina, 1959, **33**(381): 12-15.

Preliminary tests with fungicidal seed treatments for control of *Rhizoctonia solani* on bean seedlings showed promising results from Arasan, captan and Spergon. An organic mercury product gave some control, but Rhizoctol, Brassicol and pentachloronitrobenzene were ineffective.

2217. BETTO, E., FOA, R., AND VOLPI, A.
La competizione per il fosforo fra *Uromyces appendiculatus* (Pers.) Link e *Phaseolus vulgaris* L. studiata con P^{32}. **(The competition for phosphorus between *Uromyces appendiculatus* and *Phaseolus vulgaris* as shown by the use of P^{32}.)** [German and English summaries ¾ p. each.]
Phytopath. Z., 1958, **32**: 283-92, bibl. 9, illus.

Radioactive orthophosphoric acid was applied to the stem bases of bean seedlings, and the leaves were inoculated with bean rust spores. Whether the P^{32} was applied before or after inoculation, it accumulated in certain spots on the leaves 24 hours before the same spots manifested hypersensitivity. Lesions due to abrasion with very fine carborundum powder showed P accumulation, but larger wounds did not. As the pathogen developed spores, these accumulated P to such an extent that they were 22 times as rich as the leaf tissue in that element 30 days after inoculation.

2218. BALDACCI, E., AND BETTO, E.
Esame dell'efficacia fungicida per copertura e sistemica di alcuni antibiotici su *Uromyces appendiculatus* [Per.] Lk. **(A test of the superficial and systemic fungicidal action of certain antibiotics on *Uromyces appendiculatus*.)** [French summary ½ p.]
Reprinted from *Agric. ital.*, 1958, **58**: 289-301, bibl. 9.

Griseofulvin at 100 p.p.m., although completely effective against the rust fungus when applied to the roots of beans in hydroponic culture, was toxic to the plants. As a foliar spray at 20 or 100 p.p.m. it gave 50–70% control of the disease, and its action was improved by the addition of glycerine with or without IAA. Distamycin at 100 p.p.m. was fully effective as a foliar spray, but chloramphenicol at 300 p.p.m. was rather less so (89% control). Streptomycin, patulin and aureomycin were ineffective, and Acti-dione was toxic to beans even at 10 p.p.m.

2219. Taylor, C. E.
Control of the bean stem maggot by insecticidal dressings.
Rhod. agric. J., 1959, **56**: 195-6, bibl. 5.

Seed dressings of aldrin, dieldrin and endrin emulsions at the rate of 0·2% insecticide w/w of seed gave almost complete protection against *Agromyza phaseoli* on haricot beans. No phytotoxic effects were noted. [For earlier trials see *H.A.*, 29: 2488.]

2220. Peay, W. E.
Laboratory tests for control of the beet leafhopper on snap beans grown for seed.
J. econ. Ent., 1959, **52**: 700-3, bibl. 2, illus.

Many chemicals were tested, both as seed and foliar treatments, for control of the beet leafhopper (*Circulifer tenellus* (Bak.)) and consequent reduction in curly top on snap beans grown for seed. Outstanding results were obtained with a foliar spray containing 0·125% of Thimet (*O,O*-diethyl S-(ethylthio)-methyl phosphorodithioate) and 4% of juice pressed from sugar beets highly resistant to curly top. Good control was also obtained with DDVP, lindane-DDT-Aroclor, DDT, dimethoate, and Thimet separately. The seed treatments were less satisfactory. [Author's abstract.] —Agric. Res. Serv., U.S.D.A.

2221. Harries, F. H.
Effects of physical properties of derris dusts on their toxicity to the Mexican bean beetle.
J. econ. Ent., 1959, **52**: 1017, bibl. 3.

A decrease in the particle size of both the ground derris root and the pyrophyllite diluent increased the toxicity of derris dusts containing 1% rotonone to *Epilachna varivestis* infesting young bean plants. —Agric. Res. Serv., U.S.D.A.

2222. Cavalli, L. M.
Esperimenti di lotta contro il *Tetranychus telarius* L. **(Experiments on control of *T. telarius*.)**
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1958, **65**: 55-62, bibl. 9.

In tests on runner beans 8 out of 9 acaricides proved very effective against the adult mites. Three products selected for laboratory tests killed all the larvae and eggs, although they had been only partially effective against these in the field. They were diethylthiophosphorylacetic isopropylamide, Aramite (2(*p*-tertiary-butylphenoxy) isopropyl-2-chloroethyl sulphite), and parachlorophenyl benzenesulphonate-butyl-phenoxy isopropylchloroethyl sulphite.

2223. Narasaki, T., and Kawamura, S.
The oligosaccharides of some Japanese legumes. I. Preliminary experiments by paper chromatography. [English, with Japanese summary ½ p.]
Tech. Bull. Fac. Agric. Kagawa Univ., 1958, **9**: 157-60, bibl. 12.

Seeds of 5 species, including *Phaseolus vulgaris*, *P. chrysanthos* and *Vigna sesquipedalis*, were examined. No reducing sugars were found, but all contained oligosaccharides, including sucrose, raffinose and stachyose.

2224. Ahmed, M. B.
The effect of the presence and absence of phosphorus at different periods of growth of *Vicia faba*.
Indian J. agric. Sci., 1958 (issued 1959), **28**: 43-56, bibl. 9.

The effects of withholding P were studied in sand culture. The critical period for lack of P to affect fruit and seed production was found to be the first 6 weeks after full germination.—Cairo Univ.

2225. Anthistle, M. J., Ashdown, D. F., and Dickinson, D.
Ripening of broad beans.
J. Sci. Food Agric., 1959, **10**: 412-14, bibl. 6.

Of 2 varieties tested Triple White was superior to the green garden type as regards tenderness and content of alcohol-insoluble solids. No correlation was found between skin toughness and extractable *leuco*-anthocyanins. Changes in texture and composition during ripening are described.—Fruit Veg. Canning Quick Freez. Res. Ass., Chipping Campden.

Legumes—peas.

(*See also* 1511, 1526, 1532, 1536, 1542, 1547, 1558, 2034, 2318, 3083.)

2226. Pea Growing Research Organization Ltd.
Annual Report for 1958, Yaxley, 1959, pp. 27, bibl. 14, 1s. 6d.

A summary is given of experimental results, including: The evaluation of new vining varieties and selection for wilt (*Fusarium oxysporum* f. *pisi*) resistance are described. Combine drilling for narrow-drilled pea crops was attended by some risk, unless a minus-N fertilizer compound was used under moist seedbed conditions at a rate not exceeding about 2 cwt./acre. Of 11 pea varieties treated with 6 herbicides only one suffered serious damage; no taints occurred. A comparison between the normal accumulated heat unit and the growth rate unit, which is defined and which takes environmental conditions into account in addition to air temperature, suggests that the latter bears a closer relationship to the actual rate of pea growth. In a micro-plot trial 2% Thimet granular at 10 lb. active ingredient per acre mixed into the top 6 in. of eelworm-infested soil enabled Rondo peas to produce a full crop, although the treatment did not prevent build-up of the pest. No protection was obtained from applying Thimet in a band 7 in. below the seed. 1,4-Dichloro-2-butyne (5%), raked into healthy soil, did not injure Thomas Laxton peas, but Mylone (85%) and Nemagon (10%) depressed emergence. The nematicides were applied at the rate of 30 and 60 lb. active ingredient per acre. Seed or soil treatment with certain systemics has given effective control of the pea weevil, but no recommendations can be made as yet in view of the toxicity of the compounds. The pea moth was found to require about 480 day degrees to the onset of emergence, i.e. much less than had been suggested by other workers. Finally, certain aspects of the Dried Pea Seed Approval Scheme are discussed.

2227. Hyde, R. B., and Shewfelt, A. L.
Chemical and quality evaluation of selected varieties of peas, snap beans and sweet corn.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 27-8.

Peas: A113 was the outstanding early variety; its short vine made it suitable for garden but undesirable for commercial use. Dark Podded Perfection, Wyola and Arctic Sweet gave the best performances among other varieties. Optimum canning maturity of all varieties occurred when the alcohol-insoluble solids content averaged 14·7%, the moisture content 79·0% and the tenderometer reading 107. These three measurements were closely related to one another. *Snap beans:* Increasing the harvest interval from 4 to 9 days resulted in a significant lowering of all quality factors but did not affect the ascorbic acid content of 4 varieties. Pearlgreen was suitable for canning and freezing but was lighter in colour than Topcrop and Rival.

2228. Chipman, E. W., and Hope, G. W.
Varietal trials.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, p. 19.

Peas: Dark Skinned Perfection, Freezer 626, Victory Freezer, Small Sieve Freezer and Perfected Freezer were suitable for freezing, taste panel preference being in the above order. *Broccoli:* Chinook, C.T. Strain and Waltham 29 (Ottawa) were very similar and most suitable for freezing.—Res. Stat., Kentville, N.S.

2229. Strachan, G.
Dry peas for soup.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, p. 49.

Foreign, Chancellor, 3884-A and 3883-C the best of 18 varieties tested.

2230. Yen, D. E., and Casey, R. J.
Assessment of new wilt-resistant pea strains for market growing.
N.Z. Comm. Gr, 1959, **15**(1): 27-9.

The results of recent trials show that resistance to *Fusarium orthoceras* has been successfully bred into the varieties Greenfeast, William Massey and Onward without reducing their yields and shelling-out percentages.—D.S.I.R., Otahuhu and Lincoln, N.Z.

2231. Corrales M., A.
Aclimatación de arvejas y habas de procedencia española. (**Acclimatization [in Peru] of peas and broad beans from Spain.**
Inf. mens. La Molina, 1959, **32**(376): 15-19.

Among the 16 pea varieties tested Express, Negret, Príncipe Alberto and Annonay were apparently immune to *Erysiphe polygoni* and were earlier than the local varieties. All 5 of the broad bean varieties from Spain showed these same favourable qualities, and 4 of them were also highly resistant to rust (*Uromyces fabae*), but all 5 were susceptible to infestation by root nematodes.

2232. Arončuk, M. M.
Early ripening pea variety, Timirjazev 49. [Russian.]
Izv. Timirjazev. seljsk. Akad., 1959, No. 4, pp. 217-21, illus.

Earlier ripening and higher yielding than the varieties Kapital and No. 572.

2233. Vincent, C. L.
Pea plant population and spacing.
Bull. Wash. St. agric. Exp. Stats **594**, 1958, pp. 9, bibl. 2, illus.

The canning pea variety Perfection 10 was used in a 4-year trial to compare 3 plant spacings. Plants spaced 2 × 8 in. or 4 × 4 in. apart yielded a significantly greater number of harvestable pods and weight of green-shelled peas per acre than plants spaced 1 × 16 in. apart. There were no significant yield differences between the first 2 spacings. A factor responsible for the lower yield of plants spaced 1 × 16 in. apart was the relative infrequency with which these plants produced pods on the basal node. Height was also affected by spacing. There was no difference in yield of dry seed between any of the 3 spacings.

2234. Biswas, B. B., and Sen, S. P.
Translocation and utilisation of sulphate-S^{35} and phosphate-P^{32} in the pea plant.
Indian J. Plant Physiol., 1959, **2**: 1-8, bibl. 14, illus.

Autoradiographs showed that sulphate-S^{35} was translocated from the roots to the topmost leaf in less than 15 mins. and accumulated in large amounts [see also *H.A.*, 27: 3065]. Radioactivity appeared later in the lower leaves. More than 30 S-containing compounds were formed in the topmost leaves within 1 hour of supplying S^{35} to the roots. Lower leaves contained mostly inorganic sulphate. Translocation of phosphate-P^{32} was similar to that of sulphate, but it was metabolized more slowly.—Bose Res. Inst., Calcutta.

2235. KVASNIKOV, B. V., DOLGIKH, S. T., AND LEBEDYANTSEVA, O. N.
Carbohydrate and nitrogen contents of peas and beans in relation to nodule formation. [Russian?]
Mikrobiologija, 1958, **27**: 599-604, bibl. 15, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-247-8.

Active nodule formation was associated with relatively high monosaccharide and N contents in the roots. Nitrogen contents of crops of lettuce grown subsequently in this soil were 10–20% higher than those of controls.

2236. VAN SCHREVEN, D. A.
Effects of added sugars and nitrogen on nodulation of legumes.
Plant and Soil, 1959, **11**: 93-112, bibl. 53.

Experiments on clover, lucerne and peas are described. The effects of 5 successive leaf sprays with 0·5% sucrose at 3–4-day intervals and the use of additional artificial light were studied in inoculated peas grown aseptically in the absence and presence of combined N. The depressing effect of too low a light intensity on the weight of nodules and N fixation, but not on the number of nodules, was partially overcome by the sugar solution. In another experiment, in which various concentrations of urea solution were sprayed on to pea leaves at 4–5-day intervals, the number and total weight of nodules decreased; nodule size increased with 0·5 and 1%, and decreased with 4 and 8%, solutions. A decrease in nodule size was correlated with a high top/root ratio, and a high root N content.—Microbiol. Lab. Zuiderzee Reclam. Works, Kampen.

2237. RAZUMOV, V. I., AND OLEJNIKOVA, T. V.
The relationship between vernalization and day length. [Russian.]
Agrobiologija, 1959, No. 6, pp. 874-82, bibl. 21.

Unvernalized pea plants flowered just as quickly as vernalized plants when they were grown in long days (24 hr.). Vernalized plants grown in short days (10 hr.) flowered almost as quickly as plants grown in long days, whereas unvernalized plants, particularly of winter varieties, were very slow to flower in short days.

2238. PATON, D. M.
The role of flower inhibition in the photoperiodic and vernalization responses of peas.
Abstr. in *Aust. J. Sci.*, 1958, **21**: 145.

The node number at which the first flower is formed in early varieties of peas is normally insensitive to photoperiodic and vernalization treatments. Late pea varieties respond in a quantitative manner to both these factors. A marked delay in flowering node is induced in vigorous scions of an early variety grafted to stocks of a later variety only when the stock is unvernalized and when the grafted plant is grown in short days. These results are best interpreted as the transfer of a photoperiodic and temperature-sensitive flower inhibitor from the late stock to the early scion. Weak growth of the scion after grafting causes a very significant delay in the flowering node of the early scions in all graft types. This growth effect is especially marked with vernalized stocks, the growth rate–vernalization interaction being highly significant. There is no significant interaction of growth rate with photoperiod in any of the graft types.

2239. ASSELBERGS, E. A., MOHR, W., AND WETHINGTON, E.
Effect of gibberellic acid and Fertidyne on the yield characteristics of Laxton peas and Ferguson tomatoes.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 22-3.

Peas: Fertidyne lowered yield considerably. Field application of GA at 10 p.p.m. increased yield by 10%; other GA applications lowered yields: GA also delayed maturity. Empty seed coats tended to be associated with Fertidyne treatment. No flavour changes were noted by the taste panel. *Tomatoes:* Fertidyne had no significant effect on yield. GA affected fruit shape. Malformations, which were especially noticeable in early picks, were considered to be due to double flower formation. Fertidyne and GA did not affect pH, acidity or soluble solids of the fruit. Fertidyne appeared to delay maturity.

2240. BALLARD, J. C., AND OTHERS.
Effect of gibberellin on the yield and maturity of processing peas.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 624-9, bibl. 4.

Gibberellin (1,000 p.p.m.) applied as a seed treatment to field grown peas reduced the stand of plants but hastened emergence and early growth. Sprays (50 p.p.m.) applied in the second true-leaf stage resulted in temporary growth acceleration. Neither treatment affected maturity or yield. Sprays applied during late bloom had no effect on yield or maturity except in the variety Perfection, in which yield was depressed and maturity delayed.

2241. Meier, W., Bérces, J., and Bamert, A.
Die Blattrollkrankheit der Erbsen. **(Leaf roll of peas.)**
Mitt. schweiz. Landw., 1959, **7**: 177-84, bibl. 5, illus.

Control measures recommended are rotation with non-leguminous crops and early sowing of peas.

2242. Wallen, V. R., and Hoffman, I.
Fungistatic activity of captan in pea seedlings after treatment of the seeds or roots of seedlings.
Phytopathology, 1959, **49**: 680-3, bibl. 14, illus.

Pea seedlings grown from seed treated with Orthocide 75 (75% captan) were slightly less susceptible to leaf and pod spot (*Ascochyta pisi*) than seedlings from untreated seed. Seedling roots absorbed captan more readily when it was dissolved in acetone or chloroform than when it was in a water suspension. Chloroform was phytotoxic to the seedlings, but the use of captan in acetone markedly reduced the development of the fungus.—Canada Dep. Agric., Ottawa.

2243. Franssen, C. J. H.
Relations between time of controls and phenological data with respect to several pests occurring on peas and beans.
Höfchen-Briefe, 1959, **12**: 22-8.

A discussion, with examples.

2244. Salunkhe, D. K., Pollard, L. H., and Taylor, R. W.
Evaluation of maturity of peas and utilization of over-mature peas by deep-fat frying.
Indian J. Hort., 1957, **14**: 83-8, bibl. 6, illus., [received 1959].

The maturity of peas determined satisfactorily by a tenderometer, a Shear Press and a refractometer and also by microscopic examination of starch grains.

2245. Zaleski, J.
Phosphorylase activity in green peas (*Pisum sativum* L.) for canning. [Polish?]
Roczn. Technol. Chem. Zywności, 1959, **4**: 75-112, bibl. 79, from abstr in *J. Sci. Food Agric.*, 1959, **10**: ii-267.

Improved methods for determining the most suitable time for harvesting green garden peas for canning are described. The phosphorylase activity estimation was an accurate method, but its application was involved, and the determination of inorganic P contents of the seeds was suggested. Both methods were several times more sensitive than the dry weight estimations now in use. Biochemical aspects of the ripening of green peas were examined, and the phosphorylase activity studied after shelling and storage.

Lettuce and other salad crops.

(*See also* 1531, 1559, 1603, 2100, 2337.)

2246. Raphael, T. D., and Frappell, B. D.
Lettuce varieties.
Tasm. J. Agric., 1959, **30**: 237-43, illus.

In experiments at Summerleas Imperial 615, Imperial Triumph and Early Great Lakes proved outstanding for yield. Imperial D and Webb's Wonderful were consistently the earliest, but Imperials 615 and Triumph were the most successful in the summer months. Seedlings thinned *in situ* hearted 7–14 days earlier and gave higher yields than transplants. Losses through "sliming" (rots following fluctuations in water supply) were greatest in early varieties such as Webb's Wonderful, Imperial D, Supreme and Satisfaction. Fourteen varieties are described briefly.

2247. Poole, C. F.
New sweet potato and lettuce varieties developed by H.A.E.S.
Hawaii Fm Sci., 1959, **8**(1): 1-2, illus.

Lettuce trials have shown Kulanui and Laupili to be very suitable at higher, and Kauwela and Kulanui at lower, elevations. Kulanui has also proved superior in other tropical countries.

2248. Reggiani, F.
Le insalate. Produzione fondamentale per l'interno e l'esportazione. Esempi di ottenimento di nuove stirpi. **(Lettuces and endives. Fundamental production for home consumption and export. Examples of new strains.)**
Ital. agric., 1959, **96**: 1067-74, illus.

New varieties of lettuce and endive described, with notes on their resistance to diseases, frost, bolting and damage during storage and transport.

2249. Gagnebin, F.
Un nouveau cultivar de laitue pommée: Satellite. **(A new cabbage lettuce: Satellite.)**
Rev. hort. Suisse, 1959, **32**: 360-2.

Description of a summer lettuce that develops a heavy head in 8–9 weeks; it was bred at the University of Geneva.

2250. Porcelli, S.
Miglioramento genetico della lattuga (*Lactuca scariola* L. var. *sativa* L. cv. Trocadero). **(Genetical improvement of the lettuce variety Trocadero.)** [English summary ¼ p.]
Ann. Sper. agrar., 1959, **13**: 789-822, bibl. 29, illus., and *Sementi elette*, 1959, **5**(3): 71-8, illus.

A comprehensive account, including export figures, floral biology, selection technique, temperature responses, bolting, pigmentation and chemical composition.

2251. Leeper, P. W., Whitaker, T. W., and Bohn, G. W.
Mildew resistant variety.
Amer. Veg. Gr, 1959, **7**(9): 18, illus.

Characteristics of the lettuce variety Valverde.

2252. HABER, A. H.
Rendering the germination of light-insensitive lettuce seeds sensitive to light.
Physiol. Plant., 1959, **12**: 456-64, bibl. 13.

For an advance abstract see *H.A.*, 29: 497.

2253. MANCINELLI, A.
Azione de alcuni inibitori sulla germinazione. Azione di alcuni inibitori metabolici su semi in germogliazione di *Lactuca sativa* L. **(The action of certain inhibitors on germination. The action of certain metabolic inhibitors on germinating lettuce seeds.)**
Nuovo G. bot. ital., 1958, **65**: 818-20, and 855-8, bibl. 4.

Lettuce seeds were placed in distilled water or in olutions of inhibitors in darkness at 22 and 26° C., alf of each group being exposed 2 hours later or 2½ min. to near-red light. The reversing ction of the light on inhibition at both temperaures was nil with sodium azide, extremely slight with streptomycin, and considerable with both thionine and penicillin. With hydroxylamine, owever, light did not affect the inhibition at 22° C., ut almost completely cancelled it at 26° C. During the first 6 days germination in ethionine, ydroxylamine or sodium azide reduced the rate f synthesis of ribonucleic acid and retarded the isappearance of reserve proteins compared with ermination in distilled water.

2254. TOOLE, V. K., AND CATHEY, H. M.
Germination of Grand Rapids lettuce and *Lepidium virginicum* seeds as affected by gibberellin.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): xvi.

ibberellin dissolved in water caused lightquiring seeds of Grand Rapids lettuce to germinate in total darkness, and seeds thus treated ere very difficult to inhibit with far-red radiation. emperature blocks to germination could also be moved by gibberellin.—U.S.D.A., Beltsville, Md.

2255. MAYER, A. M., NEUMAN, G., AND EVENARI, M.
The effect of light and gibberellic acid on the elongation of lettuce hypocotyls.
Bull. Res. Coun. Israel, Sect. D, 1959, **7D**: 97-100, bibl. 7.

ibberellic acid stimulated hypocotyl elongation, d green light enhanced this stimulation. GA so appeared to reverse inhibition of elongation used by light of various wave lengths.—Hebrew niv., Jerusalem.

56. N.S.W. DEPARTMENT OF AGRICULTURE, BIOLOGICAL BRANCH.
Some diseases of lettuce.
Agric. Gaz. N.S.W., 1959, **70**: 305-8, illus.

ontrol measures suggested for lettuce mosaic, otted wilt and downy mildew.

2257. STRONG, R. G., AND RAWLINS, W. A.
Field evaluation of four insecticides for the prevention of lettuce-yellows disease with known populations of viruliferous six-spotted leafhopper.
J. econ. Ent., 1959, **52**: 686-9, bibl. 9.

Artificially reared, viruliferous six-spotted leafhoppers, *Macrosteles fascifrons*, were caged over small areas of lettuce in the field to test the effectiveness of DDT, demeton, malathion and parathion applied as emulsion sprays for lettuce-yellows prevention. Differences were found between sprayed and unsprayed lettuce in the incidence of disease, and in the residual effectiveness of the insecticides tested. Differences between insecticides were significant but not readily apparent by mere visual inspection. [From authors' abstract. For an evaluation of the insecticides for control of the leafhopper, see *H.A.*, 29: 2540.]—Cornell Univ., Ithaca, N.Y.

2258. QUINTANA, V. U.
Development of improved merchandising practices for vegetables.
Philipp. Agric., 1959, **43**: 301-9, illus.

A comparison of commonly-used, large bamboo baskets and experimental wooden crates for lettuce transport has shown that the total weight loss, including damage due to rough handling, was 29% with the baskets and 23% with the crates for untrimmed lettuce; whereas with field-trimmed lettuce in crates the loss was only 2·5%. The cost of the crates was slightly less than that of the baskets. Celery also suffered considerably less damage in crates.

2259. PORCELLI, S.
Miglioramento genetico della cicoria endivia (*Cichorium endivia* L. var. *latifolia* Hort. cv. Scarola). **(Genetical improvement of the endive variety Scarola.)**
Sementi elette, 1959, **5**(3): 79-82, illus.

The desirable features fixed in this non-curly variety by 4 years' selection are enumerated.

2260. ANGELI, L.
Cikóriasaláta hajtatási kísérletek eredményei. **(Results of experiments on the forcing of chicory.)**
Kert. szől. Főisk. Évk., 1958, **22**(3): 3-12, from *Hung. agric. Rev.*, 1959, **8**, Abstr. 220.

The operations involved in the production of chicory as a salad crop are described, and the possible use of thermal or factory waste waters as cheap sources of heat is discussed. Under commercial conditions average yields of 10 kg. per sq. m. of forcing area are obtained, whereas in experiments a yield of 18 kg. per sq. m. was achieved.

Mushrooms.

2261. Bels, P. J., and van Soest, G. J. A.
Some Dutch costings.
MGA Bull., 1959, No. 118, pp. 320-5.

Translation of article from Dutch growers' bulletin *Champignon-cultur* on mushroom costs and returns.

2262. Partenie, S.
Valorificarea raţională a serelor prin cultivarea lor cu ciuperci. **(Increasing glasshouse and hot bed productivity by mushroom growing.** [English, French, Russian and German summaries about ½ p. each.]
Grăd. Via Liv., 1959, **8**(8): 10-16, illus. + summaries.

Methods of raising mushrooms in greenhouses during the autumn, before the planting of tomatoes and cucumbers, are described. Heated Dutch frames may also be used for mushroom growing in the spring after seedling production is over.

2263. Gromov, N. G., and others.
The use of substitutes for horse manure in the cultivation of mushrooms. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 24-8, illus.

The materials tested were cow, pig and sheep dung mixed with straw, sawdust or potato haulms. Cow, pig or sheep manure with straw proved suitable substitutes for horse manure, and these manures with sawdust were suitable for the lower layers of the mushroom beds. A lower layer of town refuse produced smaller yields, as did a mixture of horse manure and potato haulms.

2264. Flegg, P. B.
Compost salinity and cropping.
MGA Bull., 1959, No. 118, pp. 317-18, bibl. 4.

Previous work [see *H.A.*, 29: 2501] has shown that (1) mushroom compost contains a high proportion of soluble salts, (2) mushroom mycelium, in pure culture, is adversely affected by increasing levels of soluble salt in the medium and (3) additions of salts to the compost have resulted in a marked reduction of productivity. Methods of composting leading to abnormally high compost salinity should be avoided or approached with great caution.

2265. Flegg, P. B.
The casing layer, fruiting and moisture stress.
MGA Bull., 1959, No. 117, pp. 283-6, bibl. 3.

A brief explanation of the meaning of moisture stress (pF) in the casing layer as affecting fruiting in mushrooms [see also *H.A.*, 28: 2608 and 3795m; and 29: 2501].

2266. Flegg, P. B., and Wyatt, I. J.
Some effects of salts on mushroom pests and diseases.
A.R. Glasshouse Crops Res. Inst., 1958, 1959, pp. 89-91.

Sodium chloride added to the casing layer significantly reduced *Mycogone perniciosa* but made little difference when added to the compost. The addition of calcium nitrate to both the compost and casing layer significantly reduced the number of sciarid larvae.

Okra.

(*See also* 1555.)

2267. Srinivasan, P. M., and Gowder, R. B.
A note on the preliminary investigations for the control of the bhendi shoot and fruit borer, *Earias* species.
Indian J. Hort., 1957, **14**: 241-4, bibl. 1, [received 1959].

Dieldrin (0·1%) and endrin (0·02%) effectively reduced *Earias* attacking okra.

Onions and related crops.

(*See also* 1500, 2116, 2478, 2541, 2606, 3041.)

2268. Daeva, O. V.
Central Asian onion species and trials on their cultivation in Moscow. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 31-9, bibl. 18, illus.

Of the 228 onion species known in the U.S.S.R. 147 grow in Central Asia. These 147 species are classified into 3 main groups. Of 26 species tested in the Moscow region 16 grew well. They were mainly indigenous and upper-steppe species.

2269. Šmatok, I. D.
On the chemical composition of the wild onions growing in the Murmansk region. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 73-6, bibl. 8, illus.

Among several species *Allium obliquium*, *A. altaicum* and *A. victorialis* made the most rapid growth, and *A. ledebourianum* the slowest. *A. ledebourianum* and *A. victorialis* possessed the highest carotene contents, and the latter also contained the most ascorbic acid. The amount of soluble carbohydrates in the leaves of *A. ledebourianum* was similar to that of the variety Bessonov, whereas the others may be regarded as less pungent onion species. In general, all the wild varieties possessed qualities resembling those of the cultivated onion, and they can be recommended for cultivation because of their resistance to frost and their very rapid spring growth.

2270. Guimarães, F. F.
Estudos preliminares sôbre a produção de cebola híbrida no Rio Grande do Sul. **(Preliminary studies on the production of hybrid onions in Rio Grande do Sul [Brazil].)** [English summary 1 p.]
Reprinted from *Agron. sulriogr.*, 1958, **3**: 23-34, bibl. 12.

uccessful crosses between American male-sterile nd indigenous Brazilian types.

271. (Kehr, A. E., and Horton, J. C.)
Develop onion hybrids resistant to pink-root.
Ia Fm Sci., 1959, **14**: 329.

rom Spartan, Epoch and Bonanza.

272. (Kehr, A. E., and Horton, J. C.)
New onion inbred released to seedsmen.
Ia Fm Sci., 1959, **14**: 361.

owa 736 is an early high yielder, stores well and as deep colour and tight scales.

273. Smith, F. G., and Jones, A. G.
Production of onion sets.
Agriculture, Lond., 1959, **66**: 298-300, bibl. 4.

f the varieties tried Rijnsburger, Best of All, harpe's Big Ben and Stuttgarter Reisen were the ost satisfactory. To prevent bolting sets were ored at 82° F. with high humidity; this treatment so promoted vigorous growth and later maturity. he optimum size of sets was ½–¾ in. in diameter, nd wastage in storage averaged 12% by number nd 10–25% by weight.—Stockbridge House exp. ort. Stat., Cawood, Yorks.

274. Statens Forsøgsvirksomhed i Plantekultur.
Præparering af skalotte- og kepaløg (stikløg) til læggebrug 1952-57. **(The preparation of shallot and onion sets during the period 1952-57.)**
Tiddsskr. Planteavl., 1959, **63**: 347-50.

he treatment of shallot sets has already been escribed [see *H.A.*, 29: 1485]. In addition, one ear's preliminary data are presented on onion elds following different treatments of the sets. he highest yield and lowest percentage of bolting ere obtained from 4 months' storage at 27° C.

75. Genkov, G.
The effect of storage conditions on the yield and bolting of onion sets. [Bulgarian, with Russian and English summaries ¾ p. each.]
Nauč. Tr. visš. selskostop. Inst. G. Dimitrov, Sofia, 1959, **6**: 301-28, bibl. 24.

hen onion sets of 1·5–2 cm. and 2–3 cm. bulb iameter were stored in a cold attic, with tempera-re variations depending on outdoor conditions, ere was a low percentage of bolting the following ar. Sets stored in a cellar at 10° C. produced wer yields than those stored in the cold attic. hen sets were heated at 35° C. for 10–30 days fore planting, the percentage of bolting was creased and yields were increased, provided the ather after planting was not cold and damp. orage at temperatures above 18° C. resulted in wer yields than storage in the cold attic. Elon-ted sets produced larger bulbs than round sets.

2276. Peregudt, M. F.
The influence of selection, based on the length of the dormant period, on the keeping quality of onions. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 9-11.

Onions with a short dormant period, i.e. poor keepers, proved to be most winter hardy. Transplanting onions, for seed production, in the Crimea in October without selection thus promoted the natural selection of strains with poor keeping qualities. The progeny of onions selected on the basis of the length of their dormant period tended to be similar to the parent plant in this respect.

2277. Soloman, S., and Patil, J. A.
Bulb size and seed yield in onion (*Allium cepa* L.).
Poona agric. Coll. Mag., 1959, **50**: 30-3, bibl. 3.

In experiments at Niphad large mother bulbs produced more seed heads, more seeds per head and a greater weight of seed per plant than smaller bulbs. In addition the smaller bulbs lost more weight in storage, and suffered more rotting than the larger ones. The larger bulbs also came into bloom earlier. The authors recommend that for seed production bulbs of not less than 40 g. in weight should be used.

2278. Corrales M., A.
Costo de producción de semilla botánica de cebolla en el valle del Rímac. **(Cost of production of onion seed in the Rímac valley [Peru].)**
Inf. mens. La Molina, 1959, **33**(378): 8-10.

Production of seed from the onion varieties Colorada and Arequipeña in this region of Peru proved too costly for introduction on a commercial scale. Bulb yields after seed harvesting averaged 12,000 kg./ha., of which 14·5% represented top grade bulbs. Seed production averaged 75 kg./ha., germination was 60%, or higher with complete ripening, and bulb yields from these seeds amounted to 16,000 kg./ha. [For earlier work see *H.A.*, 28: 3699.]

2279. Kakehi, M.
Studies on planting of onions in spring. [Japanese, with English summary.]
Bull. Hiroshima agric. Coll., 1958, **1**(1): 15-20, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 8,541.

In a time-of-planting trial the yield of Kodaka onions increased with planting dates in the following order: February 5, March 1, November 30, March 25 and April 17. In the spring-planted plots vegetative growth was better and the plants recovered better from transplanting giving a better stand, but the harvest was delayed.

2280. Singh, J. R., and Jain, N. K.
Response of onion (*Allium cepa*) to differential fertilizer application.
Indian J. Hort., 1959, **16**: 31-8, bibl. 17.

Nutrient studies, with 3 levels each of N, P and K, showed that in the initial stages of onion growth 40 lb. N per acre were sufficient. However, later growth and yields were best with 80 lb. N per acre. Phosphorus was beneficial during the early stages of growth, but reduced growth and yield during maturation. Potash applications were negatively correlated with bulb development. Thus, in applying the three nutrients, N levels should be increased, and P_2O_5 and K_2O decreased, as growth progresses. Onion plants 30 days old responded best to a ratio of 40 : 40 : 0. At 90 and 120 days ratios of 80 : 0 : 10 and 80 : 0 : 20 gave the best growth, but the highest yields followed an 80 : 0 : 0 application.—Coll. Agric., Banaras Hindu Univ.

2281. Bălan, D.
Îngrășarea suplimentară a cepei de apă. **(Applying supplementary fertilizers to onions.)** [English, French, Russian and German summaries ½ p. each.]
Grăd. Via Liv., 1959, **8**(7): 10-12 + summaries.

The application of 180 kg. of ammonium nitrate, 330 kg. of superphosphate and 175 kg. of potash per hectare to onions, during the growing period, increased the sugar, ascorbic acid and dry weight contents of the bulbs and produced higher yields.

2282. Iwata, M., Morita, I., and Honda, F.
Effects of nitrogen, supplied at various stages of growth, on growth and yield of onions in sand culture. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1959, **28**: 96-108, bibl. 22, illus.

Nitrogen was applied at approximately monthly intervals for various periods from transplanting in November until harvesting the following June to Yellow Danvers onions growing in sand culture. Bulb yields from plants which received N up to mid- or late May, were equal to, or slightly higher than, those from plants which received N until harvest. Both top growth and bulb yields were reduced when N applications were discontinued from the latter half of April. Reductions in bulb growth and yield were much more marked when the N supply was stopped during March, and the bulbs formed were round rather than flat. Plants which began receiving N in late February or early March produced growth and yields similar to those of the controls, which received N throughout the whole period, but when N was not supplied until late March or April, growth could not catch up with that of the controls. Bulb yields were not reduced by omitting the N supply for one month. Nitrogen and dry matter contents in the onion tops increased from March until May, the increase in April being particularly striking. In bulbs N and dry matter contents increased rapidly from middle or late April until harvest. It is concluded that in Japan the period from mid- or late March to mid- or late May is critical for N supply to onions.

2283. Quaglia, A.
Il mosaico della cipolla. **(Onion mosaic.)**
Inf. fitopat., 1959, **9**: 364-5, illus.

Preventive measures against onion mosaic virus disease have given good results. They included the removal of onion seed stalks, leeks and garlic which would form winter reservoirs of the disease, and pre-germination of onion bulbs intended for seed production, so that those developing symptoms could be destroyed at an early stage.

2284. Bazán de Segura, C.
Control del moho negro de la cebolla. **(Control of black mould of onions.)**
Inf. mens. La Molina, 1959, **32**(374): 11-12.

Onion bulbs remained in good condition, and free from infection by *Aspergillus niger*, when stored for 3 months at temperatures between 0° and 10° C. in a dry atmosphere, whether untreated or previously treated with sulphur, but at temperatures of 20°–28° C. *A. niger* and other fungi caused severe rotting.

2285. Sleeth, B., and Leeper, P. W.
Control of onion tip and leaf blight.
J. Rio Grande Valley hort. Soc., 1959, **13**: 149-51, bibl. 1.

Maneb applied weekly at 4 lb. per 100 gal. per acre with 4–6 oz. of commercial spreader-sticker gave the most effective control of *Botrytis squamosa.* Parzate C at 2 lb. per 100 gal. plus the spreader-sticker was satisfactory in the early stages of the disease.—Texas agric. Exp. Stat., Weslaco.

2286. van Doorn, A. M.
Onderzoekingen over het optreden en de bestrijding van valse meeldauw (*Peronospora destructor*) bij uien. **(Investigations on the occurrence and control of downy mildew in onions.)** [English summary 5 pp.]
Tijdschr. PlZiekt., 1959, **65**: 193-256, bibl. 28, illus.

The life history of *Peronospora destructor* and factors affecting its spread are discussed. Field tests to determine weather conditions favouring infection showed that it was necessary to have a period of at least 11 hours with a R.H. (at a height of 2·2 m.) higher than 90%, beginning between 5 p.m. and 3 a.m., followed by at least 6 hours with a R.H. higher than 75%. Cultural measures recommended for control include the removal of systemically infected plants from the seed crop and minimum applications of N. For chemical control low volume sprays of zineb should be applied every 7–10 days at the rate of 3 kg. in 150–200 l. of water per ha. (200 l. per ha. for seed crops). Zineb has a growth stimulating effect, which, although it increases yield, also extends the period of ripening and consequently the risk of infection by *Botrytis allii*. Therefore zineb should not be applied later than 4 weeks before harvest. Maneb has also given effective mildew control but is not recommended, because its growth stimulating effect is even greater than that of zineb.

2287. Finlayson, D. G., and others.
Chemical control of the onion maggot in onions grown from seed in various types of soil in northwestern North America in 1955 and 1956.
J. econ. Ent., 1959, **52**: 851-6, bibl. 14.

In experiments carried out in several localities in 1955 the chlorinated hydrocarbons, dieldrin, heptachlor and isodrin gave economic control of the onion maggot (*Hylemya* [*Delia*] *antiqua*) under irrigated conditions in the interior of British Columbia and Idaho, but malathion was unsatisfactory. By contrast, in western Washington and western Oregon neither dieldrin nor heptachlor gave economic control, but isodrin and malathion showed promise. At 3 localities where emulsifiable insecticides were applied as drenches to the seed furrow, fewer seedlings emerged than where wettable powders or dusts were used. In 1956 furrow and seed treatments with dieldrin, endrin and heptachlor reduced maggot damage to 0·8% in a sandy clay loam and to 5·1% in a peat soil in British Columbia, but malathion gave no protection. In Oregon malathion and endrin gave reasonable control, but in Washington and Idaho none of the treatments was satisfactory.

2288. Guyer, G., and Wells, A.
Evaluation of insecticides for control of the chlorinated hydrocarbon resistant onion maggot.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 614-23, bibl. 2, illus.

Onion maggot (*Hylemya* [*Delia*] *antiqua*) populations resistant to chlorinated hydrocarbon insecticides were present in the major onion growing areas of Michigan by the autumn of 1957. The most effective treatments were Diazinon, Thimet and American Cyanamids 18133 and 12880. Other materials producing yields significantly greater than the control were parathion, ethion, Trithion, Guthion, Di-syston, EPN-300, Co-Ral, and VC-13. Dust or granulated formulations were more effective than liquid treatments. There was no indication of off-flavour or reduction in quality of onions treated with parathion or Diazinon. [From authors' summary.]

2289. Lall, B. S., and Verma, S. K.
Field evaluation of some organic phosphates for the control of the onion thrips, *Thrips tabaci* Lind. Thysanoptera: Thripitidae.
Curr. Sci., 1959, **28**: 417-18, bibl. 4.

In a field trial Folidol at 0·025% gave better control of onion thrips than similar concentrations of Diazinon, malathion and Metasystox. Folidol remained toxic for 12 days and also appeared to stimulate plant growth.—Bihar agric. Coll., Sabour.

2290. Lorca, F. L.
Experimentos de control del trips de la cebolla (*Thrips tabaci* Lind.). **(Control experiments against onion thrips.)** [English summary ¼ p.]
Agric. téc. Chile, 1958, **18**: 16-23, bibl. 8.

Solutions of 13 different insecticides were applied at 760 l. per ha. 20 and 40 days after planting. Dieldrin at 2 kg. 50% w.p. per ha. gave the best control, namely 87–92% reduction in population after 2 days, and had an effective residual action (69% reduction) for 20 days.

2291. Statens Forsøgsvirksomhed i Plantekultur.
Tørring og opbevaring af spiseløg. **(The drying and storage of onion bulbs.)**
Tidsskr. Planteavl, 1959, **63**: 358-61.

Artificial drying of onion bulbs at 40° C. proved greatly superior to field drying. A higher percentage of bulbs remained healthy after cold storage at 0° C., or after ventilated storage at 5–10° C., than after warm storage at 15–20° C. In a good year bulbs may be dried at any time within two weeks of lifting, but when their keeping quality appears to be poor they should be dried without delay.

2292. Sinha, A., and Sanyal, A. K.
Separation and estimation of sugar components of *Allium cepa* Linn. (N.O. Liliaceae) by paper chromatography.
Curr. Sci., 1959, **28**: 281-2, bibl. 5.

R_f values and quantities of arabinose, xylose, ribose and rhamnose.

2293. Basmakov, A. M.
Garlic from aerial bulbs. [Russian.]
Sad i Ogorod, 1959, No. 9, p. 30.

Methods of cultivation described briefly.

Rhubarb.

2294. King, E. M.
Forced rhubarb.
Hort. Circ. Minist. Agric. B.C. **81**, 1959, pp. 4.

An outline of indoor and outdoor culture.

Root crops.

(*See also* 1505, 1512, 1530, 1532, 2089, 2166-2169, 2174, 2175, 2330, 2541, 3047, 3065.)

2295. Hughes, J. D.
A note on foliar diagnosis of boron deficiency in beetroot.
Qd J. agric. Sci., 1959, **16**: 85-6, bibl. 2.

Beetroot plants grown in sand were supplied with nutrient solutions in which B was provided at 9 levels ranging from nil to 5 p.p.m. Leaves were analysed for B when the roots had reached full size. Severe to slight deficiency symptoms were evident when the leaves contained 15 to 18 p.p.m. of B, and it would appear that the minimum leaf content of B for normal growth is about 20 p.p.m. The highest rate of B application (5 p.p.m.) was toxic to the young plants.

2296. Gelmetti, A.
Efficacia anticercosporica di alcuni anticrittogamici acuprici. **(The effectiveness of some non-copper fungicides against *Cercospora*.)**
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1958, **65**: 13-18, bibl. 6.

Beetroot plants were sprayed 3 times at 13-day intervals with various fungicides beginning at the first appearance of symptoms caused by *Cercospora beticola*. The most effective fungicide was 1% bordeaux mixture, which reduced the percentage of diseased plants from 99 to 49·8. Approximately half this reduction was achieved with ziram + copper oxychloride and with one formulation of thiram with or without sulphur, but another thiram product was completely ineffective.

2297. Kononkov, P. F.
TMTD—an effective preparation against fungal diseases of carrots. [Russian.]
Sad i Ogorod, 1959, No. 10, pp. 28-9.

Losses of carrots in winter storage, due to black rot and sclerotinia, were much reduced by dusting with TMTD (thiram). Carrots stored for transplanting, for the production of seed, benefited from additional treatment at the time of transplanting.

2298. Howitt, A. J., and Cole, S. G.
Chemical control of the carrot rust fly *Psila rosae* (F.), in western Washington.
J. econ. Ent., 1959, **52**: 963-6, bibl. 4, illus.

In 1957 a strain of *Psila rosae* appeared that was highly resistant to the chlorinated hydrocarbons normally used for control. Of 22 compounds tested as soil or furrow treatments Diazinon as a furrow treatment at 1, 2, 3 or 4 lb./acre of active ingredient gave outstanding control and Am. Cyanamid 18133, Dicapthon and parathion, also in the furrow, gave fair control. All general soil treatments were ineffective, as were furrow applications of the other insecticides tested.—Wash. agric. Exp. Stat., Pullman.

2299. Stratton, C. L.
Root crops—always something new.
Amer. Veg. Gr, 1959, **7**(4): 48-51, illus.

A new machine is described for washing and packaging carrots and parsnips, which, with an 11-man crew, can handle 65 crates of carrots an hour. A mechanical carrot harvester, that digs 200 bushels an hour, is also briefly described.

2300. Armstrong, J. L.
Research on gibberellin. I. Gibberellin studies on radishes.
Bios, 1958, **29**: 139-41, illus., from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 8,623.

Radishes treated with 1, 10 and 100 p.p.m. of gibberellin showed increased height and paler green, less pliable leaves curled under at the edges. —Wm Jewell Coll., Liberty, Mo.

2301. Dawes, C. J., and Bowler, E.
Light and electron microscope studies of the cell wall structure of the root hairs of *Raphanus sativus*.
Amer. J. Bot., 1959, **46**: 561-5, bibl. 22, illus.

Spinach.

(*See also* 1535, 1550, 2116.)

2302. Sparkes, C. H.
Spinach nutrition in relation to manganese, phosphorus, and lime fertilization.
Diss. Abstr., 1959, **20**: 1121, being *L.C. Card No. Mic.* 59-3602 of 66 pp.

In greenhouse studies with a soil low in available Mn there were no significant effects on the Mn and Fe contents of plant tissue or on fresh and dry weights per plant from interactions between 2 levels each of Mn, P and lime. A combination of low soil Mn and high soil applications of lime reduced the Mn contents of spinach tops from 150 to 30 p.p.m., which is near deficiency level. A soil application of manganese sulphate (18 lb. Mn per acre) approximately doubled the Mn contents of spinach tops. Mn contents were reduced by about 40 p.p.m. following a soil application of 700 lb. of hydrated lime per acre, which increased the soil pH from 5·1 to 6·5. A significant increase in the Fe content of spinach tissue and in the fresh and dry weights per plant followed a higher P application in one experiment, but the effect was not repeated. In field trials the Mn contents of plants receiving about 3 lb. of manganese sulphate per acre as an aqueous spray were 2–3 times those of plants which had received a soil application of 75 lb. manganese sulphate per acre. Differences in leaf contents of Mn varied from 20 to 30 p.p.m. over a pH range of 6·3 to 7·3. No relationship was found between dry weight per plant and any of the fertilizer treatments.—Rutgers Univ.

Sweet and red peppers.

2303. Špaldon, E., and Gromová, Z.
Organizácia porastu koreninovej papriky ako faktor úrody. (**The organization of red pepper growing as a factor in productivity.**) [English and Russian summaries ½ p. each.]
Sborn. vys. Šk. pol'nohosp. v Nitre, agron. Časť, 1958, pp. 43-55, bibl. 5.

Replicated trials were conducted in 1957, a favourable year for pepper growing, to ascertain whether the current practice of growing groups of 2–3 plants 35 cm. apart in rows 50 cm. apart could be replaced by spacing which would facilitate mechanical cultivation. Growing 2–3 plants in groups 25 or 30 cm. apart in rows 60 cm. apart showed no significant differences in yields from those obtained at the normal spacing.

2304. Špaldon, E., and Pevná, V.
Výsledky pokusu s hustotou porastu zeleninovej papriky (*Capsicum annuum* L. var. *grossum* Sendt.) pri zavlažovaní postrekom a brázdovým podmokom. (**Results of a spacing experiment on sweet pepper (*C. annuum* var. *grossum*) under sprinkler and furrow irrigation.**) [English and Russian summaries ¾ p. each.]
Sborn. vys. Šk. pol'nohosp. v Nitre, agron. Časť, 1958, pp. 95-109, bibl. 7, illus.

n 1957 the pepper variety Kalinkov was planted t 4 spacings with 1, 2 or 3 plants per group, and he plants were either sprinkler or furrow irrigated. The results showed that, although density under rrigation had no significant effect on total yield or hemical composition, it affected earliness and the ize and weight of the fruits. The most economically favourable conditions were sprinkler rrigation with single plants spaced 60 × 25 cm. This made mechanical cultivation possible. Furrow rrigation resulted in earlier ripening, increased ruit size and possibly also a higher vitamin C ontent than sprinkler irrigation.

305. Downes, J. D., Heslip, R., and Honma, S.
Effect of polyethylene mulches, starter solution and kind of transplant on yields of sweet peppers.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **41**: 641-7, bibl. 11.

n one trial mulching with 4-ft. black polythene rips increased yields by 41% compared with ultivated controls. In a second trial, however, ield differences were insignificant. Mulching enerally promoted vegetative growth at the xpense of early fruiting. The use of a 10–50–10 arter fertilizer solution almost doubled the early ields of plants transplanted without containers, ut did not increase the total yields of any type of ansplant. The use of bands, i.e. transplants rown in 3× 3 in. wood veneer bands, increased yields by 15%. Neither the type of transplant nor the use of starter solution affected the response to mulching.

2306. Krishnamurthi, S., and Bhandari, P. B.
Modification of leaves in the chilli (*Capsicum frutescens* L.) as a result of whole plant sprays of high concentrations of certain plant regulators ("plant hormones").
Indian J. Hort., 1957, **14**: 239-40, bibl. 6, illus., [received 1959].

Abnormalities induced by 2,4-D and β-naphthoxyacetic acid.

2307. Săvulescu, A., Bucur, E., and Constantinescu, V.
Putregaiul fructelor de ardei. (**Pepper fruit rot.**) [English, French, Russian and German summaries.]
Grăd. Via Liv., 1959, **8**(8): 51-6, illus. + summaries.

This disease, previously attributed to *Actinomyces todschidlowski*, is considered to be physiological, as no pathogen could be isolated from the fruit and artificial inoculations gave negative results. Rotting was more prevalent in years with alternating wet and dry conditions and is thought to be due to sudden withdrawals of water from the fruit. The effects of various cultural measures on the incidence of rotting are described.

2308. Zanardi, D.
Un cinquantennio di prove di lotta contro la "moria" del peperone. (**Fifty years' experiments on the control of capsicum wilt.**) [English summary 10 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 18-28, bibl. 20, illus.

Italian work since 1907 has shown the importance to wilt incidence not only of species of *Fusarium*, *Phytophthora*, *Verticillium*, *Pythium* and *Phoma*, but also of nematodes of the genera *Heterodera* and *Meloidogyne*. Results to date from the use of soil fumigation with such substances as methyl bromide alone or with chloropicrin and DD indicate a promising future for the control of wilt by the combined use of fumigants and fungicides. Exact methods still need to be worked out.

2309. Boháč, J.
Metóda postupných zberov na určovanie skorosti, úrodnosti a času zberov koreninovej papriky. (**A method of progressive picking to determine the earliness, productivity and harvesting times of red pepper.**)
Sborn. vys. Šk. pol'nohosp. v Nitre, agron. Časť, 1958, pp. 5-20, bibl. 16.

Ten varieties and strains of pepper (*Capsicum annuum*) were picked 8 times at intervals of 4–6 days from August 30 to October 5. By this means the length of the vegetative period (from sowing to the harvest of 25% of the crop), the length of the fruiting period, the time of mass ripening, productivity and optimum harvesting dates in relation to price fluctuations were established for these varieties under the conditions of the experiment.

Tomatoes—general.

(*See also* 1535, 1537, 1542, 1548, 1583, 1818, 2239, 2556, 3057, 3058.)

2310. Martin, P.
Culture de la tomate de serre. (**The culture of glasshouse tomatoes.**)
Rev. d'Oka, 1959, **33**: 133-9.

Several different cropping regimes for Quebec are described, which make full use of the glasshouse for the whole year.

2311. Stevenson, E. C., Tomes, M. L., and Johnson, K. W.
Dwarf tomatoes.
Amer. Veg. Gr, 1959, 7(9): 12, 29, illus.

Suggestions on the culture of dwarfs at 10,000–15,000 plants per acre in Indiana [see also *H.A.*, 29: 2550].

2312. Somos, A.
Changes in the growing period of tomatoes under the influence of climatic factors and cultural practices. [Russian, with German and English summaries 14 and 11 lines.]
Acta agron. hung., 1959, **9**: 61-95, bibl. 21.

For another account of this work see *H.A.*, 30: 766.

Tomatoes—breeding and varieties.

(*See also* 2199, 2366.)

2313. Rick, C. M.
The role of natural hybridization in the derivation of cultivated tomatoes of western South America.
Econ. Bot., 1958, **12**: 346-67, bibl. 16, illus.

Studies on wild tomatoes and their relatives in Ecuador, Peru and northern Chile, and tests on their progenies at the University of California, Davis, have shown that, in contrast to the garden tomato which is generally self-pollinated, much cross-pollination occurs among wild varieties in their natural habitat. There is also evidence of hybridization between *Lycopersicon esculentum* and *L. pimpinellifolium* in parts of the region. The high rate of cross-pollination has led to much variability and to the rapid evolution of new forms. The systematic relationships between *L. esculentum* and *L. pimpinellifolium* and the derivation of the cultivated tomatoes of western South America are discussed in the light of the results of this study. [For natural cross-pollination of cultivated tomatoes see *H.A.*, 28: 1509.]

2314. Choudhury, B.
Development of seed and its parts. I. Of *Lycopersicon esculentum* Linn. II. Of hybrid seed of *Lycopersicon esculentum* × *Lycopersicon peruvianum*.
Indian J. Hort., 1958, **15**: 72-5, bibl. 6, illus., and 1959, **16**: 23-30, bibl. 15.

The development of the endosperm and integuments described in detail.

2315. Shilling, P. R.
An investigation of the hereditary character, woolly, in the tomato.
Ohio J. Sci., 1959, **59**: 289-302, bibl. 5, illus.

Including mention of lower viability of seeds from woolly (abnormally hairy) plants.

2316. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med sorter af tomater i vaeksthus 1957-58. (**Variety trials with glasshouse tomatoes in 1957-58.**)
Tidsskr. Planteavl, 1959, **63**: 539-42.

Among 9 glasshouse varieties tested Danimuna and Revernum showed most promise.

2317. Marchesi, G.
Confronti fra cultivar di pomodoro. (**Comparisons of tomato varieties.**) [French and English summaries ¼ p. each.]
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1958, **65**: 63-112, bibl. 6.

Data tabulated for 36 tomato varieties, including yield, refractometer values, reducing sugar content, acidity, and resistance to *Alternaria solani* and *Septoria lycopersici*.

2318. Barbieri, R., and La Rotonda, C.
Aspetti biologici e tecnologici del miglioramento delle piante ortive di interesse per l'industria conserviera meridionale. (**Biological and technological aspects of improving vegetables which concern the southern Italian canning industry.**)
Sementi elette, 1959, **5**(3): 35-48, bibl. 35.

Various strains of the Lampadina tomato are compared for fruit weight, yield, and freedom from blossom-end rot and fruit constriction. In general, this variety is not very suitable for canning, and in consequence a rigorous selection and rehabilitation of the original S. Marzano is essential. Fruit characteristics are described and acid and sugar contents are given for 11 tomato varieties suitable for concentrate production, and table varieties are briefly discussed. [For earlier work see *H.A.*, 28: 1503.] A brief account is also given of pea and bean varieties for canning, and of plans for their improvement.

2319. Harrison, A. L.
Developing tomatoes with multiple disease resistance.
J. Rio Grande Valley hort. Soc., 1959, **13**: 139-44, bibl. 6, illus.

Methods of testing tomato varieties and strains for resistance to the main fungus diseases and to root-knot nematodes (*Meloidogyne* spp.) are outlined. Tomatoes have been bred for growing under conditions in Texas, each showing resistance to local forms of wilt (*Fusarium lycopersici*), collar rot (*Alternaria solani*), grey leaf spot (*Stemphylium solani*), leaf mould (*Cladosporium fulvum*) and root-knot. Those possessing in addition suitable horticultural characters will be commercially available within a few years. Attempts to develop mosaic resistance have not yet been successful.—Texas agric. Exp. Stat., Yoakum.

2320. Hille, M.
Das Verhalten des deutschen Tomatensortimentes gegenüber *Synchytrium endobioticum* (Schilb.) Perc. **(The reactions of German tomato varieties to *Synchytrium endobioticum*).** [English summary 10 lines.]
NachrBl. dtsch. PflSchDienst., Braunschweig, 1960, **12**: 12-14, bibl. 12.

All tomato varieties listed in the Federal German Register for 1958 proved susceptible.

2321. Asselbergs, E. A., and Lyall, L. H.
Tomato variety studies.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 20-1.

In a 2-year comparison trial of John Baer and Ferguson the marketable yield of John Baer was 5% higher. Ferguson had slightly the larger fruits. The colour of both raw and processed juice and the pH and acidity of canned juice were very similar in both varieties. Ferguson contained approximately 15% less ascorbic acid than John Baer.

2322. Stevenson, E. C., Johnson, K. W., and Tomes, M. L.
Performance of processing tomato varieties in Indiana, 1956-1958.
Res. Bull. Purdue Univ. agric. Exp. Stat. **684**, 1959, pp. 11.

Assessment of yields, earliness, disease resistance and processing qualities.

2323. Dacus, A. D., and Leeper, P. W.
Tomato varieties for greenhouse production.
J. Rio Grande Valley hort. Soc., 1959, **13**: 135-8, bibl. 5.

Buckcross hybrids "O" and "V" the most suitable for local conditions.

2324. Foskett, R. L.
A new canning tomato for Northern Colorado.
Pamphl. Colo St. Univ. Exp. Stat. **5-S**, [1959?], pp. 3.

Kenosha developed for an area of relatively short growing season and low temperature.

Tomatoes—raising and planting seedlings.

(*See also* 2179, 2180, 2335, 2340, 2350, 2354.)

2325. Gigante, R.
Danni da carbolineum in semenzai di pomodoro. **(Injuries from carbolineum in tomato seed beds.)** [English summary ¼ p.]
Bol. Staz. Pat. veg., 1958 (issued 1959), **16**: 121-8, bibl. 15, illus.

The leaves of tomato seedlings growing in frames were severely damaged by vapours from the carbolineum used to preserve the wood of the frames. The injury was greatest on the parts most exposed to the light.

2326. Challenger, S., and Glazebrook, J. H.
Tomato yield trials, 1958-59.
N.Z. J. agric. Res., 1959, **2**: 1017-24, bibl. 4, illus.

The use of high pressure mercury vapour lamps for illumination gave only a small, non-significant increase in early yield, probably because the average daily hours of sunshine in the New Zealand winter is more than double that registered at Kew in England. Pricking out the seedlings into 3½-in. pots, however, gave a highly significant increase in early yield compared with using plant frames (strips of wood veneer folded to make a container without top or bottom and then placed in seed boxes). Late plantings, although sown and pricked out at the same time and giving the same yield and cropping season, produced a much smaller early yield, and therefore lower financial return, than early plantings. The Canadian leaf-mould-resistant variety V-548 significantly outyielded Potentate.—Canterbury agric. Coll.

2327. Hamson, A. R.
Hardy tomato transplants produce higher yields.
Fm Home Sci., Utah, 1959, **20**(1): 12-13, 18, illus.

Experiments have shown that adequate thinning of plants in nursery beds at an early stage to eliminate small sappy transplants and also the lifting of plants from moist soil to ensure the preservation of good lateral roots with soil adhering to them are likely to have a pronounced effect on the yields of field-grown tomatoes.

2328. Cervato, A.
Esperienza sui sistemi di allevamento del pomodoro da conserva. **(An experiment on staking systems for tomatoes grown for canning.)**
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1958, **65**: 1-12, bibl. 7, illus.

The highest total yield was obtained by the "castelletto" system, in which the plants were staked individually and the stakes tied in groups of 4 in pyramid formation. When staking was entirely omitted the yield was slightly, but not significantly, lower. Upright stakes with 2 horizontal wires per row gave significantly lower yields than either of the above systems, and inclined stakes arched together over 2 rows, with 1 horizontal wire per row ranked 3rd in yield order. These results were obtained in a favourable season and on good soil.

2329. COOPER, A. J., AND EVANS, J. M.
The effect of planting density on the yield of the Potentate tomato.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 61-3, bibl. 3.

A comparison between densities of 17,424 and 24,891 plants per acre has shown the yield, fruit number, mean fruit weight and percentage of uniformly and non-uniformly coloured fruits to be generally similar, only the mean fruit weight being significantly different at the 5% level. Considered in conjunction with earlier results the data suggest that with an increase in planting density up to a certain limit there is an increase in fruit numbers per unit area, the density within this range having little effect on fruit size. Still higher densities increase fruit numbers but decrease fruit size and so do not increase yield; the density at which this occurs is considered to lie between 14,500 and 17,500 plants per acre.

2330. LÖBL, D., AND POPA, E.
Stabilirea spaţiilor nutritive la tomatele pitice și la morcovi în condiţii de mecanizare. **(Establishing profitable planting distances for dwarf tomatoes and carrots under mechanized conditions.)** [English, French, Russian and German summaries each about ½ p.]
Grăd. Via Liv., 1959, **8**(5): 10 + summaries.

Dwarf tomatoes yielded better when spaced 30 cm. apart in double rows 90 + 50 cm. apart than when spaced at 40 or 50 cm. along the rows or when planted in double rows 80 + 60 cm. apart or in single rows 70 cm. apart. Single rows 70 cm. apart with the plants set 30 cm. apart along them are preferred, however, because they make mechanical cultivation possible. With carrots single rows 30 cm. apart produced higher yields than single rows 45 cm. apart or than double rows 50 + 20 cm. apart. The cost of production per kg. was least, however, with single rows 45 cm. apart.

Tomatoes—nutrition, irrigation and mulching.

(*See also* 1527, 1541, 2116.)

2331. MEMEDOVA, Z. JU.
The effect of different temperatures and of mineral nutrition on the size and development of tomatoes. [Azerbajdžan, with Russian summary 1 p.]
Tr. Inst. Bot. Akad. Nauk. Azerb.SSR., 1959, **21**: 122-31, bibl. 15, illus.

N and P fertilizers each at 50 mg. per kg. of soil were introduced into containers holding 12 kg. dry soil, and then the soil moisture was raised to 60%. At temperatures higher than 30° C. and with the addition to the soil of 200 mg. of $(NH_4)_2SO_4$ growth was markedly increased. The application of $(NH_4)_2SO_4 + K_2SO_4$ or of $(NH_4)_2SO_4 + NaH_2PO_4$ at 200 + 150 mg./kg. soil intensified root growth regardless of the temperature, the latter mixture showing the better results. Dry matter accumulation, which occurred most intensively in the upper leaves, was greater at normal temperatures than at high temperatures.

2332. WOOLHOUSE, H. W.
Nitrate and ammonium ions in the nutrition of young tomato plants.
From abstr. in *Aust. J. Sci.*, 1958, **21**: 143.

The possible consequences of by-passing the inorganic pathway by using ammonia as the N source were considered. Evidence was obtained which suggested that the modified growth of tomato plants supplied with ammonium N only (e.g. fresh and dry weight yield, shoot length, leaf size, protein and lignin content and failure to develop root hairs) is associated with the absence of nitrate rather than with the presence (i.e. toxic or adverse effect) of ammonia. An interesting feature of ammonia-grown plants was the high content of inorganic and trichloracetic-acid-soluble organic phosphate and low content of insoluble phosphate compared with plants receiving nitrate.—Bot. Dep., Univ. Adelaide.

2333. HALSTEAD, R. L., AND HEENEY, H. B.
Exchangeable and water-soluble potassium in soils and degree of saturation in relation to tomato yields.
Canad. J. Soil Sci., 1959, **39**: 129-35, bibl. 7.

For an advance abstract see *H.A.*, 28: 3774.

2334. GERALDSON, C. M.
Cause and control of blossom-end rot of tomatoes.
Circ. Fla agric. Exp. Stats **S-101**, 1957, pp. 8, illus., [received 1959].

Blossom-end rot, of which Ca deficiency is the fundamental cause, can be controlled by the maintenance of a favourable Ca ratio through increasing the supply of relatively soluble Ca salts and avoiding excesses of soluble NH_4, K, Mg, or Na salts and excessive total salts, coupled with the periodical application of 4 lb. anhydrous calcium chloride per 100 gal. water applied as a foliar spray when the plant requirement of Ca is expected to exceed the supply.

2335. PEDAŠ, F. I.
A trial on the foliar nutrition of tomato seedlings with micro-elements. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 101-5, bibl. 5.

Seedlings receiving foliar nutrition made stronger and more rapid growth after transplanting. Co, Mo and urea, applied in small doses, produced 49·5, 48·3 and 19·5% increases in yield, respectively. Leaf sprays of these elements had a marked effect on physiological processes, and encouraged the formation of generative organs. Fruit ripening was also accelerated.

2336. Jelenič, Đ., Vajnberger, A., and Rašić, J.
Uticaj bora na sadržaj vitamina C, šećera i ukupne kiselosti u crvenom patlidžanu. **(The effect of boron on the content of vitamin C, sugar and total acids in tomatoes.)** [Yugoslav and English.]
Zemlj. Bilj., 1958, **7**: 387-91 (Yugoslav and bilingual tables) and 392-5 (English), bibl. 7.

B applied to pot grown tomatoes at 0·1–0·5 mg. per kg. of dry chernozem soil increased their vitamin C content, but at 1–1·5 mg. it depressed it. The simultaneous application of NPK tended to counteract the favourable effect of B. The sugar content was slightly reduced by B alone and increased by B plus NPK, whereas total acids were increased by B and even more so by B plus NPK.

2337. Wilson, G. L., and Notley, L. F.
Seed soaking as a method of supplying the molybdenum requirements of lettuce and tomatoes.
Aust. J. agric. Res., 1959, **10**: 621-7, bibl. 7.

Tomato and lettuce seeds were soaked in sodium molybdate solutions for 8 hours and considerable outward diffusion occurred subsequently during germination. Plants grown from these seeds in Mo-deficient solutions were compared with Mo-supplied controls. The requirements of tomatoes were met by soaking the seeds in solutions of ,000 and 50,000 p.p.m. of Mo, but satisfactory results were not obtained with lettuce.—Univ. Qd.

2338. Cormack, R. G. H.
The effects of disodium versenate on the roots of tomato seedlings.
Canad. J. Bot., 1959, **37**: 1227-32, bibl. 12, illus.

Dilute solutions of this metal-chelating agent caused abnormalities and the suppression of root hair production. The abnormalities were characterized by the separation of epidermal cells, possibly caused by the inability of the cells to incorporate Ca into their elongating walls.—Univ. Alberta, Edmonton.

2339. Vittum, M. T., Tapley, W. T., and Peck, N. H.
Response of tomato varieties to irrigation and fertility level.
Bull. N.Y. St. agric. Exp. Stat. **782**, 1958, pp. 78, bibl. 11, illus.

In field trials over a 5-year period irrigation, which was applied whenever the available water in the upper 24 in. of soil dropped below 50%, reduced early yields of marketable tomatoes but significantly increased later and total yields. The average increase was 1·54 tons per acre per year, or 17%. Doubling the recommended application of complete fertilizer slightly increased early and late yields, and significantly increased mid-season and total yields. The average annual increase, 0·87 ton per acre, would pay for the additional fertilizer. Red Jacket was the highest yielding variety, producing 11·38 tons per acre, followed by Red Top, Gem and Longred. Varieties responded differently to irrigation and fertilization, John Baer showing the greatest response to irrigation and Red Top to fertilization.

2340. Kononkov, P. F.
Inducing early ripening in intervarietal hybrids of tomato by controlling soil moisture conditions in the seedbed. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(10): 27-30.

Restriction of the water supply to seedlings, for a 50-day period in the seedbed in frames, induced earlier ripening and larger early crops after transplanting than did normal watering. The effects of restricting the water supply in the seedbed to seedlings of the 2nd generation were transmitted to plants of the 3rd generation, which produced larger crops and larger fruits with a slightly higher dry matter content, when they themselves were not watered in the seedbed.

2341. Schleusener, P. E., and Somerhalder, B. R.
High tomato yields possible.
Neb. Exp. Stat. Quart., 1959, **6**(1): 6-7, illus.

Irrigating only until the first harvest produced the highest yield of mature fruit, namely 29·7 tons per acre. When irrigation was maintained throughout the season the total yield was greater, but this included a higher proportion of immature fruit and only 27·5 tons of mature fruit. Two non-irrigated trials gave lower yields, and of these one in which a plastic mulch was used produced a somewhat greater quantity of immature fruit.—North Platte Exp. Stat.

2342. Korenevskaja, V. E.
On the system of irrigating tomatoes grown on dark turf soil in the Volga-Ahtubinsk river valley.
Vest. Mosk. Univ., Ser. biol., 1959, **14**(1): 93-100, bibl. 12.

Investigations have shown that for tomatoes the effective depth of the irrigated layer is 50 cm. To keep this layer at the optimum moisture level (70–65%) about 500 cu.m. of water should be applied per hectare at 8–12-day intervals during June, July and the first half of August.

2343. Babuškin, L. N.
The determination of the water requirement of vegetables based on sap concentration. [Russian.]
Fiziol. Rast., 1959, **6**: 480-3, bibl. 8.

In field experiments irrigating tomatoes when the cell sap concentration of the leaves rose to 7·5–9% (as determined in boiled leaf sap) resulted in higher yields and better utilization of the water applied than did the application of water when the soil moisture before fruiting declined to 19% and during fruiting to 21–22%.

2344. McGuire, D. C.
Tomato yield increased by black plastic mulch.
Hawaii Fm Sci., 1959, **8**(1): 4-5, illus.

A 0·0015-in. thick film increased yields from 32,000 to 47,000 lb. per acre. The cost, including hand application, using film 4 ft. wide on beds 5 ft. apart, was $200 per acre.

Tomatoes—growth and physiology.

(*See also* 2363.)

2345. Cooper, A. J.
A note on the relation between the position of tomato inflorescences and axillary shoot growth.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, p. 60, bibl. 1.

Removal of either the upper or lower inflorescence in Potentate had little effect on the pattern of vigour of axillary shoot growth, which in all cases was most vigorous when it arose in a leaf axil immediately below an inflorescence and least vigorous when it arose in a leaf axil immediately above one.

2346. Genkel', P. A., and Kušnirenko, S. V.
The photosynthesis of tomato plants, hardened by pre-sowing treatment at variable temperatures. [Russian, with English summary 10 lines.]
Fiziol. Rast., 1959, **6**: 446-50, bibl. 14.

The average rate of photosynthesis was found to be much higher at all stages of growth in hardened tomatoes than in the unhardened controls [see also *H.A.*, 28: 3748]. Lowering the night temperature to 3 to 5° C. caused a 5- to 20-fold greater reduction in photosynthesis in the controls than in the pre-treated plants.

2347. Morgan, D. R., and Street, H. E.
The carbohydrate nutrition of tomato roots. VII. Sugars, sugar phosphates and sugar alcohols as respiratory substrates for excised roots.
Ann. Bot. Lond., 1959, **23**: 89-105, bibl. 12.

The respiratory responses of excised tomato roots, previously maintained in a sugar-free medium, to certain sugars, sugar phosphates and sugar alcohols were measured. The only compounds to stimulate respiration to a marked degree were sucrose, dextrose and laevulose, and this effect was inhibited by sodium azide and dinitrophenol. Mannose also inhibited the respiration of sucrose, but this action was reversed by the addition of dextrose or xylose. [For parts V and VI see *H.A.*, 29: 2578.]—Univ. Coll., Swansea.

2348. Orel, L. I.
A study of the distribution of carotenoids and fats in the pistils of tomato flowers by fluorescent microscopy. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1959, **24**(8): 31-4, illus.

The localization of carotenoids and fats in the gynoecia and androecia of 3 types of tomato during 5 stages of flower development has been observed by treatment with rhodamine and ultraviolet irradiation under a microscope. It would appear that both groups of compounds may take part in the formation, fertilization and fusion of the gametes.

2349. Singh, J. P.
The effect of some new growth regulating compounds on growth of coleus and tomato seedlings.
Indian J. Hort., 1957, **14**: 145-50, bibl. 10, illus., [received 1959].

Tomato plants sprayed with 1,000 p.p.m. of 1-naphthoic acid showed some increased growth. The application of 6-quinolinecarboxylic acid and 1-hydroxy-2-naphthoic acid, however, considerably reduced plant growth in comparison with the controls. Sprays of 1,4-naphthalenediol at several concentrations markedly reduced the growth of both tomato and coleus seedlings. Soil application of 25 p.p.m. of 4-(*p*-ethoxyphenylazo)-m-phenylenediamine significantly increased the fresh weights of tomato plants.—Mich. St. Univ., E. Lansing.

2350. Singh, J. P.
Growth of tomato plants as affected by transplanting treatments with new plant regulators.
Indian J. Hort., 1957, **14**: 223-9, bibl. 5, [received 1959].

Growth of tomato seedlings was considerably checked following soaking for 16 hours in 100 p.p.m. of 1-naphthoic acid, 6-quinolinecarboxylic acid or 1-hydroxy-2-naphthoic acid, and all seedlings were killed by 1,000 p.p.m. of 1-naphthoic acid and 1-hydroxy-2-naphthoic acid. The toxic effect of these chemicals was considerably reduced by their application through a medium of paper and peat moss, and significant increases in plant growth were obtained with 50 p.p.m. 1-naphthoic acid and 6-quinoline-carboxylic acid applied by this method. Plants treated with 50 p.p.m. of 4,4′-methylenebis-3-hydroxy-2-naphthoic acid through paper and peat moss before transplanting in the field showed a significant increase in the weight of their tops 37 days after transplanting.—Mich. St. Univ., E. Lansing.

Tomatoes—diseases and pests.

(*See also* 2099, 3041, 3048.)

2351. Linn, M. B., and Luckmann, W. H.
Tomato diseases and insect pests. Identification and control.
Circ. Ill. agric. Ext. Serv. **809**, revised 1959, pp. 60, illus.

This latest revision of the circular adds injury from 2,4-D to the list of tomato disorders, and mites and cloudy spot to the pests. It also brings up to date the varieties resistant to certain diseases, the nformation on fungicides and insecticides and on he equipment for their application. [For previous edition see *H.A.*, 23: 824.]

2352. Kerr, A. Edwards, G. R., and Wishart, R. L.
Tomato diseases in South Australia.
J. Agric. S. Aust., 1959, **62**: 414-23, 457-66, 504-10 and 546-51, illus.

Symptoms and control of diseases due to fungi soil inhabiting and those spread by wind and water), viruses, bacteria, nematodes and physiological disorders described in considerable detail. The first part of this series of articles was menioned in *H.A.*, 30: 782.]

2353. D'Jačenko, N. N.
Methods of determining resistance of tomato plants to virus diseases. [Russian.]
Agrobiologija, 1959, No. 6, pp. 912-15, bibl. 4.

Biochemical and serological methods of testing or resistance to virus diseases were examined. At the cotyledon stage susceptibility to infection was directly related to peroxidase activity. When lants reached the five-leaf stage, sap expressed rom the seedlings under test was mixed with an qual quantity of sap expressed from plants known o be infected with tobacco mosaic virus, and the ctivity of the mixture was indicated by injecting into *Nicotiana glutinosa*.

2354. Gol'din, M. I., and Jurčenko, M. A.
Direct sowing as an anti-virus method in the control of mosaic and streak of tomatoes. [Russian.]
Tr. Inst. Microbiol. Virusol., Kaz.SSR, 1959, **3**: 166-8, bibl. 2.

n the Alma-Ata region a field sown directly with Majak tomatoes developed only 0·2% infection y tobacco mosaic virus, whereas in a field of ansplanted plants of the same variety 71% of the ants became heavily infected. In further tests ith several varieties 92% of direct-sown plants mained healthy compared with only 38% of transplanted plants. In similar tests with the tobacco varieties Alušta and Crimea the incidence of TMV was also markedly reduced by direct sowing.

2355. Howles, R.
Failure of systemically-distributed chemicals to prevent spread of TMV in tomato.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 87-8.

The chemicals tested included malachite green, eosin, thiouracil, phenoxyisobutyric acid and several derivatives of chlorophenoxy-acetic and -propionic acids. The chemicals were applied as sprays or soil drenches to healthy plants growing in physical contact with plants showing symptoms of TMV. No treatment prevented or significantly delayed virus spread.

2356. Alexander, L. J., and Campbell, R. E.
Concentration of tobacco mosaic virus in tomato plants throughout the growing season of two glasshouse crops and a field crop.
Ohio J. Sci., 1959, **59**: 271-80, bibl. 21.

In Ohio W-R Globe and Strain A Globe the number of fruits set per cluster decreased following infection with TMV, but the reduction did not persist beyond the second or third cluster. No apparent relationship was found between the virus concentration within the plants and their recovery either from the standpoint of growth or fruit set. —Ohio agric. Exp. Stat., Wooster.

2357. MacNeill, B. H., and Ismen, H.
Studies on the virus-streak syndrome in tomatoes.
Canad. J. Bot., 1960, **38**: 9-20, bibl. 22.

A TMV-potato virus X complex.

2358. Cadman, C. H., and Harrison, B. D.
Studies on the behavior in soils of tomato black ring, raspberry ringspot, and arabis mosaic viruses.
Virology, 1960, **10**: 1-20, bibl. 16.

Evidence is presented to support the theory that some soil-inhabiting organism, possibly an eelworm [see *H.A.*, 30: 447] or a fungus, is necessary for the establishment, survival and transmission of these viruses in the soil. Briefly, the evidence, obtained mainly from experiments with tomato black ring virus (TBRV), is as follows: (1) Bait seedlings did not become infected when grown in sterilized sand or in fresh or autoclaved field soils, which had been liberally watered with virus suspensions or to which roots of infected plants had been added. (2) The infectivity of soils was abolished by treatment with pentachloronitrobenzene or tetramethylthiuram disulphide, substances which had no effect on infectivity *in vitro*. (3) Certain field soils became infective when cropped with artificially infected plants, but their receptivity to the virus was abolished by autoclaving.—Scot. hort. Res.

Inst., Invergowrie, Dundee, and Rothamsted exp. Stat., Harpenden.

2359. Krüger, W.
The control of tomato canker (*Corynebacterium michiganense* (Erw. Smith) Jensen) by means of antibiotics. [Afrikaans and French summaries each ½ p.]
S. Afr. J. agric. Sci., 1959, **2**: 195-205, bibl. 4.

Ten antibiotics were tested. No encouraging results were obtained when the plants were treated after infection had taken place, and it was possible only to postpone wilting by means of albamycin. Good results were obtained by treating plants prior to infection. Albamycin and its mixtures with streptomycin and Terramycin gave the best results. The rate of infection was decreased from 80·8 and 70·4% to 19·1 and 7·4% during 1956–57 and 1957–58 respectively. When used as seed protectants, all the antibiotics with the exception of penicillin G, reduced the number of infected plants to negligible proportions. [From author's abstract.]—Coll. Agric. Exp. Stat., Potchefstroom.

2360. Nayudu, M. V.
Studies on the bacterial spot of tomato.
Diss. Abstr., 1959, **20**: 841, being *L.C. Card No. Mic.* 59-3276 of 95 pp.

Progressive symptoms following infection with *Xanthomonas vesicatoria* are described. As the leaves became older their total and soluble N contents declined and their polyphenol content rose, and these changes were accompanied by reduced susceptibility to the disease. There was also a marked increase in the polyphenol content of the leaves following infection. The disease developed most rapidly at 24° C. Very low or very high levels of N, P and K nutrition markedly retarded plant growth and the disease. Amino-acid contents varied considerably according to the nutrient status, and it is suggested that the bacterium needs a certain balance of amino acids for good growth and successful pathogenesis.—Univ. Wis.

2361. Rotem, J.
The influence of sandstorms in the Negev on the sensitivity of potatoes and tomatoes to the early blight disease.
Bull. Res. Coun. Israel, Sect. D, 1959, **7D**: 100-2, bibl. 2, illus.

A correlation has been found between the incidence of *Alternaria solani* and the frequency of sandstorms in various localities. The fungus has been shown to penetrate injured leaves far more readily than uninjured leaves. A simple method of estimating the extent of mechanical injury on tomato and potato leaves has been evolved. Injured areas turn red when leaves are immersed for 12–24 hours in 0·1% 2,3,5-triphenyl tetrazolium chloride. A modified volumetric dust trap is being tested to see if it will provide a means of characterizing sandstorms quantitatively.

2362. Maude, R. B.
***Didymella* stem and fruit rot of outdoor tomatoes.**
From abstr. in *Trans. Brit. mycol. Soc.*, 1959, **42**: 398.

Infected propagating soil, field debris and bamboo canes were potent sources of the disease. Maneb, 1 and 2% active ingredient, was effective for eradication and protection. Captan was not so useful. A resistant strain of tomato has been bred.—Nat. Veg. Res. Stat., Wellesbourne.

2363. Bossi, R.
Über die Wirkung der Fusarinsäure auf die Polyphenoloxydase. **(The effect of fusaric acid on polyphenoloxidase.)** [English summary ½ p.]
Phytopath. Z., 1960, **37**: 273-316, bibl. 78.

A study has been made of the effect of fusaric acid on the activities of enzyme preparations from tomato plant tissues. Fusaric acid inhibits catalase and ascorbic acid oxidase only at very high toxin concentrations. Fusaric acid competitively inhibits polyphenoloxidase. The significance is discussed of this enzyme inhibition by fusaric acid during the course of the tomato wilt disease. —Inst. spez. Bot., Eidg. tech. Hochsch., Zürich.

2364. Kedar (Kammermann), N., Rotem, J., and Wahl, I.
Physiologic specialization of *Phytophthora infestans* in Israel.
Phytopathology, 1959, **49**: 675-9, bibl. 24.

As a high proportion of the races found in potatoes are capable of attacking tomatoes, adequate distances between potato and tomato plantings are advised.—Hebrew Univ. of Jerusalem, Rehovot.

2365. Scotney, P., and Nevill, W. G.
Experiments show that [tomato late blight] disease can be controlled in Natal.
Fmg S. Afr., 1960, **35**(10): 18-19, illus.

Trials over 2 seasons using Marglobe and Rutgers have shown that control of *Phytophthora infestans* is possible. Sprays and/or dusts of captan, maneb, bordeaux and copper oxychloride were applied weekly on seedbeds and subsequently every 2 weeks, except that applications were repeated after rain. Spraying was more effective and cheaper than dusting. At Cedara in the Natal mist belt, where blight is more severe, spraying was more effective, whereas at Pietermaritzburg in the tall grass-thornveld area, spraying and dusting were both effective. At both centres maneb was the most efficient fungicide tested; at Pietermaritzburg it was closely followed by bordeaux, captan and copper oxychloride, but at Cedara these last 3 were disappointing. The addition of the sticker/spreader Triton B-1956 to some of the treatments gave disappointing results. Yields, costs and net returns for the various treatments are tabulated.—Cedara Coll. Agric., and Agric. Res. Inst., Pietermaritzburg.

2366. Grümmer, G., and Günther, E.
Spritzversuche zur Bekämpfung der Fruchtfäulen an Tomaten. **(Spray studies on the control of fruit rot of tomatoes.)** [Russian and English summaries 16 and 13 lines.]
NachrBl. dtsch. PflSchDienst, Berlin, 1959, **13**: 122-6, bibl. 3, illus.

Fruit rots (in particular that caused by *Phytophthora infestans*) were controlled by several sprays of Cupral applied from the middle of July. Seven applications may be necessary, but with some varieties increases in yields were too small to justify the application of 7 or even 4 sprays. Varieties recommended for growing in the coastal area of East Germany are listed.—Inst. Agrobiol., Ernst-Moritz-Arndt Univ., Greifswald.

2367. Tucumán, Estación Experimental Agrícola.
El tizón de la papa y el tomate. **(Late blight of potatoes and tomatoes.)**
Circ. Estac. exp. agríc. Tucumán **156**, 1958, pp. 3, illus.

Control of *Phytophthora infestans* with 1% neutral bordeaux mixture or dithiocarbamates.

2368. Riggs, R. D., and Winstead, N. N.
Studies on resistance in tomato to root-knot nematodes and on the occurrence of pathogenic biotypes.
Phytopathology, 1959, **49**: 716-24, bibl. 22, illus.

Meloidogyne incognita and *M. arenaria*. [See also *H.A.*, 29: 3719.]

2369. Wilson, B. R.
Egg relationships of *Drosophila* in processed and unprocessed tomatoes in New Jersey.
J. econ. Ent., 1959, **52**: 767-8, bibl. 3.

Investigations indicated that the number of *Drosophila* eggs in processed tomatoes was more closely related to fruit injury caused during picking and handling than to pre-harvest cracking.—N.J. agric. Exp. Stat., Rutgers.

2370. Schuster, M. F.
Chemical control of *Tetranychus marianae* McG. on tomatoes in the Lower Rio Grande Valley.
J. econ. Ent., 1959, **52**: 763-4, bibl. 5.

Emulsifiable concentrates of Trithion, ethion and demeton, applied as low volume sprays at 15 gal./acre, did not give economic control of *T. marianae*. When dust formulations of 6 acaricides were applied at 30 lb./acre, 4% ethion and 2% Trithion gave very good control and showed the longest residual action.—Tex. agric. Exp. Stat., Weslaco.

2371. Hussey, N. W., Parr, W. J., and Gurney, B.
The effect of white-fly populations on the cropping of tomatoes.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 79-86, bibl. 2.

A very low population of *Trialeurodes vaporariorum* can produce sufficient honey-dew to permit sooty mould development provided the R.H. reaches 90% for 14 consecutive nights. Reduction in yield was not evident until the white-fly population had reached moderate proportions of 70 "scales" (immature stages) per $\frac{3}{4}$-in. leaf disc, at which level 70% of the fruit picked was still mould free. At 130 "scales" per disc only 13% of the fruit remained clean. Heavy infestations on young plants may adversely affect fruit set. Height growth was not impaired unless initial infection occurred when the seedlings were very small.

2372. Wene, G. P.
Demeton residues on tomatoes.
J. Rio Grande Valley hort. Soc., 1959, **13**: 155, bibl. 2.

No detectable traces of demeton were found on tomatoes gathered and frozen 7, 14, and 21 days after spraying with 0·25 lb. per acre against the tropical mite *Tetranychus marianae*.—Texas agric. Exp. Stat., Weslaco.

Tomatoes—fruit ripening and marketing.

(*See also* 1741.)

2373. Cooper, A. J.
Preliminary observations on some effects of temperature on the colour of tomato fruits on the plant.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 64-5, bibl. 1, illus.

Local colour differences were produced when temperature gradients were established across individual tomato fruits. The prototype equipment used for creating the temperature gradients is described and illustrated.

2374. Hobson, G. E.
A note on the measurement of the firmness of tomato fruit.
A.R. Glasshouse Crops Res. Inst. 1958, 1959, pp. 66-8, bibl. 2, illus.

Apparatus for measuring firmness, based on that designed by Kattan [*H.A.*, 28: 1534], is illustrated and described. The relationship between fruit colour and the firmness index and also the time between successive colour stages of ripening in detached fruits of Potentate and Immuna are recorded. Potentate was firmer during ripening and took longer to change colour.

2375. Kitson, J. A., and MacGregor, D. R.
Studies in pH of tomatoes.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. for 1958*, 1959, pp. 34-5.

On testing the pH of 5 varieties grown in 4 areas and stored for 3–4 weeks after canning there was no difference between varieties, but a significant difference was found between areas. At Vernon the average pH was 4·56, whereas at Summerland it was 4·27.—Res. Stat., Summerland, B.C.

2376. (Barger, W. R., Harvey, J. M., and Ringel, S. M.
Shipping mature green tomatoes by rail.
Agric. Mktg, 1959, **4**(11): 5.

Temperatures of 55–65° F. were required to keep mature green tomatoes in good condition. Prolonged exposure to temperatures below 50° F. caused chilling injury, which affected ripening and increased decay. [A more detailed account has been published as *Mktg Res. Rep. U.S. Dep. Agric.* 349, under the title "Transit temperatures of California mature green tomatoes".]

TOBACCO.

General.

(*See also* 2798, 3065, 3074.)

2377. CORESTA.
Actes du Deuxième Congrès scientifique international du Tabac, Juin 1958. **(Proceedings of the Second International Scientific Tobacco Congress, June 1958.)** [French and English.]
Fédération Belgo-Luxembourgoise des Industries du Tabac, Brussels, 1959, 10 × 6½ in., pp. 825, bibls, illus.

This congress, attended by delegates from nearly all the main tobacco producing countries, was held in Brussels 3 years after the first congress, at which the international organization CORESTA came into being [*H.A.*, 27: 1587]. In essence, the proceedings took the form of several themes or symposia devoted to the following subjects: (1) Tobacco virus diseases, 17 papers preceded by 2 reviews. (2) The tobacco plant and water, 6 papers preceded by 2 reviews. (3) Tobacco with a low nicotine content, 13 papers preceded by 2 reviews. (4) Tobacco smoke, 14 papers preceded by 2 reviews. (5) Tobacco fermentation, 16 papers preceded by 1 review. (6) Various communications, 10 papers on cultural and other problems. All the papers are either in French or English, and each has a summary in the other language. Abstracts of some of the papers that have appeared elsewhere in other languages have already been published in *H.A.*, notably in Vol. 29. Abstracts of some others appear below. Among others not so treated attention should perhaps be drawn especially to details of breeding programmes in the section on "low-nicotine tobaccos", to the wealth of chemical data provided in the section on "tobacco smoke" and to the accounts of experience gained with the newer rapid fermentation techniques in the section on "tobacco fermentation". Taken in all, this well-produced volume provides a valuable world-wide record of progress in research on certain aspects of tobacco production during the past three years.

2378. C.S.I.R.O., Australia.
Tobacco investigations.
A.R. C.S.I.R.O. 1957-58, 1958, pp. 29-30.

Canberra. Some plants of flue-cured type, that were resistant to blue mould, were raised by backcrossing. Blue mould was less severe on plants making rapid early growth than on stunted, slow-growing material; where plants were given no N, total lesion and sporulation areas occupied less of the total leaf area than in plants receiving N. Blue mould infection of seedlings growing under glass was controlled by benzol vapour; seedlings with stem infections of blue mould survived transplanting. A study of leaf structure and quality showed that in top grade leaves vein density was higher, cell size was smaller, and the ratio of dry weight to thickness was higher than in all other leaf grades. *Tobacco Research Institute, Mareeba.* Two Clayton hybrids and a *tabacum* × *debneyi* amphidiploid from Canada showed resistance to blue mould. In the field and also in sand cultures "trashy" leaves were produced by unbalanced nutrition.

2379. Katherine Research Station.
Tobacco.
Progr. Rep. Katherine Res. Stat. 1946-56, C.S.I.R.O., Melbourne, 1959, pp. 35-8.

Tobacco grown in the fields of the Station, which is situated in the Northern Territory of Australia, showed serious symptoms of frenching and greening. While the former disease has been largely overcome by improved soil aeration (substituting spray irrigation for furrow irrigation), greening has remained unpredictable and uncontrollable. The cultivation of flue-cured tobacco should not, therefore, be encouraged in this area for the time being.

2380. Fazio, G.
La tabacchicoltura italiana ed il Mercato Comune Europeo. **(Tobacco growing in Italy and the European Common Market.)**
Progr. agric., 1959, **5**: 1161-77, illus.

Varieties, production, labour requirements and trade figures.

2381. Mera Sandoval, O.
Apuntes sobre el cultivo de tabaco en la región oriental de Santander. **(Notes on tobacco growing in the eastern part of Santander [Colombia].)**
Agric. trop. Bogotá, 1959, **15**: 421-30, illus.

2382. Patel, G. C., Das, R., and Singh, M.
A record yield of cigar wrapper tobacco.
Indian Tobacco, 1959, **9**: 165-6, illus.
Methods used to produce a 2,088 lb./acre crop of Dixie Shade.

2383. Patel, S. M.
A special hoe for tobacco.
Indian Tobacco, 1959, **9**: 127-31, illus.
The bullock-drawn Anand cultivator described nd illustrated.

Breeding and varieties.

(*See also* 2422, 2441.)

384. Wittmer, G.
Correlazioni fra caratteri quantitativi in *Nicotiana*. 1. Studio della variabilità di alcuni caratteri fiorali. **(Correlations between quantitative characters in *Nicotiana*. 1. A study of the variability in some floral characters.)** [English summary ½ p.]
Tabacco, 1959, **63**: 161-88, bibl. 16, illus.
Comparative measurements of different parts of ne flower, which are described, indicated that the ifferences in floral characters between cultivars nd even more between species are always highly gnificant. The differences found in one and the ame cultivar in different environments were always gnificant. In one and the same cultivar grown n a particular environment the differences between lants were significant for nearly all characters, hich indicates that a necessary preliminary to the asic study of the genetic relations existing between hosen floral characters and productivity will be the stablishment of strictly homogeneous lines. Given ne cultivar and changing environment some haracters varied constantly in the same direction, s was seen with regard to 6 characters in the riety Virginia Bright and 4 in Maryland. Two haracters exhibited the same association in all ltivars and in all environments. The floral haracters studied showed under most conditions high degree of hereditability.

385. Alcaraz Mira, E.
Estudios genéticos sobre la combustibilidad del tabaco. **(Genetical studies on the burning quality of tobacco.)** [English summary 4 pp.]
An. Inst. nac. Invest. agron. Madrid, 1959, **8**: 203-669, illus.
reeding and selection carried out in Spain over e period 1953–58 are described.

2386. Cantillon, P.
Le contrôle sanitaire d'une collection mondiale de variétés de tabac et l'influence du précédent cultural sur les maladies à virus. **(Tests on the health status of a world collection of tobacco varieties and the effect of the preceding crop on the incidence of virus diseases.)**
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 97-101.
In a collection of some 450 varieties some lines have been found which show a satisfactory degree of natural resistance to virus diseases. A much higher incidence of virus occurred in the collection when it followed a sugar beet crop than when it followed oats.—Stat. Rech. État., Gembloux.

2387. Bode, O.
Recherches sur le virus de la maladie des côtes brunes du tabac. **(Studies on the virus causing brown-rib disease of tobacco.)** [English summary 8 lines.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 93-6, bibl. 11.
In West Germany tobacco, especially of the Virginia type, suffers severely from veinal necrosis, due to strains of the potato Y virus. In tobacco the virus concentration is greatly influenced by temperature, being maximal at 25° C. and low at 30° C. Among numerous *Nicotiana* species tested only 3, *N. glauca*, *N. raimondii* and *N. tomentosiformis*, proved immune, but two new tobacco varieties have shown a high degree of resistance under glasshouse conditions.—Fed. biol. Stat., Braunschweig.

2388. Koelle, G.
Versuche zur Vererbung der Krankheitsresistenz bei Tabak. 2. Mitt. Eine rippenbräune-resistente Virgin A-Mutante nach Anwendung künstlicher Mutationsauslösung durch Röntgenstrahlen. **(Experiments on the inheritance of disease resistance in tobacco. 2nd Communication. A Virginia A mutant resistant to brown-rib disease following the induction of mutations by X-rays.)**
Tabak-Forsch., 1958, **24**: 83-4, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 59/556.
X-ray treatment (up to 20,000 r.) of dry Virginia A tobacco seeds induced 3 darker, virus-free mutants, which showed resistance to brown-rib disease in a later generation. It is planned to study the possible relationship between leaf colour and resistance. [For part 4 see *H.A.*, 30: 874.]

2389. Graham, T. W., and Heggestad, H. E.
Growth response and root decay development in certain tobacco varieties and breeding lines with root-lesion nematodes.
Tobacco, N.Y., 1959, **149**(20): 21-8, bibl. 9.
Greenhouse and field tests of several varieties were

made in soil free of nematodes and in soil infested with *Pratylenchus brachyurus*, and measurements were taken to assess resistance. Greenhouse tests were more critical than field tests, and some varieties showing tolerance in the field were severely damaged in the greenhouse. Certain Canadian flue-cured varieties, American burleys, flue-cured, cigar wrapper and other tobacco types previously reported as tolerant to the root-lesion nematode proved susceptible in these tests. The highest levels of tolerance were found in 2 breeding lines derived from hybrids involving the *Nicotiana sylvestris* × *N. tomentosiformis* alloploid.—S.C. agric. Exp. Stat., Florence, and U.S.D.A., Beltsville, Md.

2390. Patel, G. C., Singh, M., and Das, R.
Natural variability and morphological classification of hookah and chewing tobaccos of North Bengal. II. Motihari tobacco (*N. rustica*).
Indian Tobacco, 1959, **9**: 101-19, illus.

Descriptions of 17 types isolated on the basis of habit, leaf and inflorescence. [For part I see *H.A.*, 30: 804.]

2391. Kincaid, R. R.
Magnolia, a new variety of cigar-wrapper tobacco.
Circ. Fla agric. Exp. Stats **S-103**, 1958, pp. 6, illus.

Derived from a cross between Rg and White Honduras, Magnolia was found to be consistently higher in yield, grading quality and burn test than either Rg or Dixie Shade. It was equally resistant to black shank and Granville wilt diseases, more resistant to coarse root and less resistant to blue mould than both Rg and Dixie Shade. Its susceptibility to rootknot was the same as that of Rg and greater than that of Dixie Shade.

2392. Wells, P. V.
An ecological investigation of two desert tobaccos.
Ecology, 1959, **40**: 626-44, bibl. 13.

N. attenuata and *N. trigonophylla* as pioneer plants of cold and warm deserts respectively.

Seeds, seed-beds and planting out.

(*See also* 2354, 2414, 2439, 2442, 2443.)

2393. Chang, Z. Y.
The effect of moisture content on the germination percentage of tobacco seeds during storage.) [Chinese, with English summary ½ p.]
J. agric. Ass. China, 1959, No. 26, pp. 49-51.

The results are tabulated of storing seeds with moisture contents ranging from 8·517–10·422% for 3·5, 5 and 8 months. As the moisture content increased the percentage germination decreased; also the decrease in viability as the storage lengthened was closely related to moisture content. Seeds containing 10·422% moisture stored for 8 months failed to germinate.—Taiwan Tob. Res. Inst.

2394. Čirkovskij, V. I.
Increasing the germination of freshly harvested tobacco seeds. [Russian.]
Tabak, 1959, **20**(4): 41-3.

Tobacco seeds kept for 2 months at 30° C. and 60% R.H. germinated more vigorously than seeds kept at a lower temperature and humidity [see also *H.A.*, 26: 2880 and 30: 811]. Excessive drying before storage should be avoided as it proved detrimental to post-harvest ripening and germination.

2395. Haarhoff, J. R.
Preparation and management of seedbeds.
Rhod. Tobacco, 1959, No. 19, pp. 3-4, illus.

Practical advice on planting, mulching and disease control.

2396. Sajnani, B. T., and Dhyani, K. C.
Effect of different seed rates in the nursery on growth and number of transplantable seedlings and yield of transplanted crop of hookah and chewing tobacco (*N. tabacum*).
Indian Tobacco, 1959, **9**: 121-4.

Seed rates of 4 and 6 lb. per acre of nursery both produced about twice as many seedlings as 2 lb. Better developed seedlings were obtained at the 2-lb. rate, although this had no effect on the ultimate yield. The 4-lb. rate appeared to be optimal, 0·3 oz. of seed sown on 200 sq. ft. of bed producing sufficient seedlings to plant 1 acre at 2 × 3 ft. spacing.—Hookah and Chewing Tob. Res. Stat., Pusa.

2397. Mathrani, D. I.
"Damping off"—how to control it.
Indian Tobacco, 1959, **9**: 185-8, illus.

Cultural methods recommended include adequate drainage of seed beds, trash burning on the beds some days before sowing, rotation, using a moderate seed rate of good quality seed, and even, regular, but not excessive watering. Several copper fungicides, including bordeaux, are considered suitable for a spraying schedule beginning 3 weeks after sowing and with 2 further applications at 5- to 7-day intervals.—Cent. Tob. Res. Inst., Rajahmundry.

2398. Splinter, W. E., and Suggs, C. W.
Mechanical transplanting of bright leaf tobacco. Part II. The effect of transplanter type and speed on operational skips. Part III. Human energy requirements for transplanting tobacco.
Tobacco, N.Y., 1959, **149**(15): 20-3, bibl. 4, illus., and **149** (16): 20-2, bibl. 5, illus.

The first paper describes 3 planting machines and shows that the 2 more mechanized transplanters increased the likelihood of error, but that the spacing of plants set with the simpler mechanical setter at high speeds was insufficiently uniform for subsequent mechanical harvesting. Transplanting error increased exponentially with planting rate as the dexterity of the operator became taxed. The second paper describes a trial which indicated that the energy needed per plant for various methods of transplanting was as follows: hand setting, 69·2 ft. lb.; dropping into hand setters, 45·1 ft. lb.; machine transplanting, 18·3 ft. lb. There was not much difference between 3 different types of power-drawn transplanter in this respect. [For part I, see *H.A.*, 30: 819.]—N.C. St. Coll., Raleigh.

Nutrient and water responses.

(*See also* 2421.)

2399. Sajnani, B. T., and Dhyani, K. C.
Fertilization of hookah and chewing tobacco (*N. tabacum*) at varying levels of NPK.
Indian Tobacco, 1959, **9**: 157-64, bibl. 5.

Nitrogen at 0, 50 and 100 lb. per acre, P_2O_5 at 0, 30 and 60 lb. per acre and K_2O at 0, 50 and 100 lb. per acre were applied to tobacco in 5 seasons. Insufficient rainfall vitiated the results in the first 2 years, but in the last 3 years 50 and 100 lb. N gave significant yield increases. In the 3rd year P produced progressive increases owing to above-average rainfall. The K response did not reach significance in any year.—Hookah and Chewing Tob. Res. Stat., Pusa.

2400. Hinkov, T. P.
Foliar nutrition of tobacco plants. [Russian.]
Tabak, 1959, **20**(4): 44-5.

In Bulgaria spraying tobacco leaves with 1–1·5% potassium sulphate or potassium chloride resulted in an increase of carbohydrates and a decrease of protein in the tobacco. NPK sprays applied at flowering time increased seed yields by 50%. The best results were obtained when spraying was done between 6 and 10 a.m. N fertilizer sprays gave very good results when applied to the first 4–5 leaves, but for later sprays 0·8% ammonium nitrate, 2% superphosphate and 0·8% potassium sulphate gave better results, producing yield increases of 8·4–13·3%.

401. Tejwani, K. G., Kurup, C. K. R., and Venkataraman, K. V.
Chemical composition of cigar tobacco leaf as influenced by its position on the stalk.
Indian J. agric. Sci., 1958, **28**: 519-29, bibl. 13.

n the typical cigar variety Vellaivazhai the contents f Ca, Mg, Na and Cl in the leaf decreased regu- rly from the bottom to the top of the plant; S nd P showed the reverse trend, and the K content nded to behave like Na but not regularly. There as also a tendency for N and nicotine to accumulate in the upper leaves. In wetter seasons with more evenly distributed rainfall nicotine, N, Cl, P, K and Mg contents of the leaves were reduced and the Ca content raised.

2402. McCants, C. B., Skogley, E. O., and Woltz, W. G.
Influence of certain soil fumigation treatments on the response of tobacco to ammonium and nitrate forms of nitrogen.
Proc. Soil Sci. Soc. Amer., 1959, **23**: 466-9, bibl. 15.

Fertilizer mixtures in which the N was all-ammonium, all-nitrate or equal parts ammonium and nitrate were applied in conjunction with the following soil fumigation treatments: not-fumigated, Dowfume W-85 (ethylene dibromide), Shell DD (dichloropropene and dichloropropane) and methyl bromide. Methyl bromide and Shell DD reduced nitrification to a greater degree than did Dowfume W-85. Three weeks after transplanting the ammonium-N and halogen contents in tobacco leaves from the ammonium-N treatment were higher than from the nitrate-N treatment on soil fumigated with Shell DD or methyl bromide, but no different for the Dowfume W-85 or not-fumigated treatments. The yield and quality index of tobacco from the Shell DD and methyl bromide fumigation treatments increased with increasing percentage of the total N applied in the nitrate form. With Dowfume W-85 the highest yield was from the mixture of ammonium and nitrate N. There were no differences in yield or quality among N treatments on soil not-fumigated. For all fumigation treatments the percentage N and nicotine in the cured leaf were higher where ammonium N than where nitrate N was applied. [From authors' abstract. See also *H.A.*, 29: 3742.]—N.C. agric. Exp. Stat., Raleigh.

2403. Kurup, C. K. R., Sastry, A. S., and Venkateswaran, M.
Biuret toxicity in cigar tobacco.
Indian Tobacco, 1959, **9**: 151-5, bibl. 13, illus.

The symptoms caused by biuret in commercial urea were temporary and did not affect the chemical composition or grading percentages of the harvested leaf.—Cent. Tob. Res. Inst., Rajahmundry.

2404. Popović, Ž., Tomljenović, T., and Mitić, D.
Asimilacija fosforne kiseline proučavana radioaktivnim fosforom pri đubrenju duvana u sudovima. (**The assimilation of phosphorus investigated by means of radioactive phosphorus applied to tobacco in pots.**) [German summary ⅓ p.]
Zemlj. Bilj., 1958, **7**: 381-6, bibl. 3, illus.

When P^{32}-labelled NaH_2PO_4 was placed 5 cm. deep, the assimilation of P by tobacco started somewhat earlier than when the fertilizer was mixed with the soil. P assimilation from the fertilizer placed 10–15 cm. deep started 15 days after planting. The lowest P utilization resulted from surface application of the fertilizer. [See also *H.A.*, 29: 1564.]

2405. TAKAHASHI, T.
Potassium nutrition of tobacco plants. [In English.]
Japanese Potassium Symposium, 1957, pp. 117-30, bibl. 10.

A review of Japanese work, quoting experimental data on: the enhancement of K-deficiency symptoms in tobacco by excess of N, particularly ammonium N; the rates of absorption of N and K from soil or nutrient solution by plants of different ages; the optimal application time for K; the superiority of basal- over top-dressing with K; relative absorption of cations; and K-induced Mg deficiency.

2406. NEAS, I.
Factors relating to off-type tobacco.
Rhod. Tobacco, 1959, No. 19, pp. 6-8, bibl. 2, illus.

Trials have been carried out in the past 4 seasons to elucidate the cause of the high chlorine content which results in off-type tobacco. Chlorides in the fertilizer produced this effect on clay soils, when drought conditions followed transplanting and sometimes also after the use of DD as a fumigant. In these cases KCl should be replaced by K_2SO_4 in the mixture. As acidity induces increased chlorine uptake, soils below pH 5·0 should be limed.

2407. SAINT-LOUP, P.
L'irrigation et fertilisation du tabac jaune. **(Irrigation and fertilization of cigarette tobacco.)**
Rev. d'Oka, 1959, **33**: 103-13.

A review from historical times.

2408. MYERS, J. M., AND CLARK, F.
Irrigate tobacco on schedule.
Circ. Fla agric. Exp. Stats **S-104**, 1958, pp. 11, illus.

The normal rainfall deficit during the tobacco growing season in Florida is 6 to 8 inches, and irrigation is necessary in 2 years out of 3. The economics of irrigation are discussed, and schedules recommended.

2409. GOODALL, D. W.
The tobacco plant and water. The growing plant. [French summary 2 pp.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 175-209, bibl. 253.

This extensive review covers diffusion pressure and osmotic pressure, root development, water uptake, transpiration, stomatal numbers and movement, turgor, microclimate, the effects of atmospheric humidity, the effects of soil moisture and waterlogging, the effects of water supply on seed germination and seedling growth, water requirements in the field, various aspects of irrigation, the effects of water supply on quality and on plant growth and physiology, drought resistance and the water content of the plant.

2410. ANITIA, N., AND ILLE, C.
Recherches concernant l'influence de l'humidité du sol sur le tabac. **(Research on the influence of soil moisture on tobacco.)** [English summary ½ p.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 251-66, bibl. 9.

The interrelationships between varying amounts of N, P, K and water on the growth of the semi-oriental tobacco variety Ghimpatzi were studied in pot culture and field experiments. The present paper describes interactions between 5 levels of N and 5 levels of soil moisture ranging from 20 to 100%. In the presence of high N increasing soil moisture was reflected in increases in stalk weight and decreases in leaf weight; with lower N these trends were less pronounced. High moisture levels advanced the date of flowering, especially when the N supply was low; at low moisture levels on the other hand the earliest flowering occurred with moderate supplies of N. Soil moisture affected leaf form, size, colour, body and pliability. The nicotine content rose with decreasing moisture when N was in limited supply, but declined under similar moisture conditions when the N supply was high. High moisture combined with high N depressed the protein content, but combined with low N it depressed the carbohydrate content. Resins were highest at low and medium rates of water supply. [See also *H.A.*, 29: 580.]—Food Res. Inst. Bucharest.

2411. (AWTRAMANI, N. A.)
Effect of varying soil moisture regimes on hookah tobacco.
Indian Tobacco, 1959, **9**: 133.

In an experiment [not described in detail here], which included 4 moisture regimes (wet, moist, semi-dry and dry), 5 N levels (0, 40, 80, 120 and 160 lb. per acre), and 2 irrigation methods (furrow and flat), the moist regime was optimal for growth and yield, but quality (based on N and moisture content) was slightly impaired. In general, the optimum N application was 120 lb. per acre, but with the dry and moist regimes it was about 80 and 160 lb. respectively. N applications saved about 40% of the water needed for the production of the same quantity of material. Furrow irrigation required 9% less water than basin irrigation. Between 75 and 87% of the water used by the crop was contributed by the upper 24 in. of soil, and the highest daily water requirement (0·39 in.) was in mid-April. During the first 60 days after translanting maximum root activity was at 3–6 in., nd thereafter at 6–9 in.—Cent. Tob. Res. Inst., ajahmundry.

412. Balcar, J.
L'importance de la rosée pour la plante du tabac.) **(The importance of dew for the tobacco plant.)** [English summary ½ p.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 267-70, bibl. 2.

he flue-cured variety Virginia Gold, recently troduced to Czechoslovakia, possesses more omata per unit of leaf area and requires more ater than the local air-cured varieties Zahradni nd Debrecinsky. Investigations have shown that ew plays an important part in providing tobacco ants with the water they need. A dew fall of 15 mm. may keep a leaf fresh for 18 out of 24 ours, compared with only 13 hours for a leaf on hich no dew has fallen. Tobacco leaves can sorb water deposited as dew, e.g. a dew fall of 1 mm. can result in about 400 litres being ab-rbed per hectare.

Growth, reproduction and desuckering.

(*See also* 2384.)

13. Tejwani, K. G., Kurup, C. K. R., and Venkataraman, K. V.
Growth and quality of cigar tobacco leaf as influenced by its position on the stalk.
Indian J. agric. Sci., 1958 (issued 1959), **28**: 199-209, bibl. 16.

ter plants of Vellaivazhai cigar tobacco (*N. bacum*) were topped to 14 leaves, the bottom eaves developed very little and new growth was iefly confined to the upper half of the plant, e top 3 leaves making the greatest growth. aves at positions 5–14 gave a higher percentage weight of good grade leaf than did the lowest ves. Leaves at positions 5–12 had the best, d the 4 bottom leaves the poorest, burn.

14. Bolsunov, I.
Prinzipien und Schemata für eine rationelle Saatgutvermehrung bei Tabak. **(Principles and schemes for rational seed production in tobacco.)** [English summary ½ p.]
Reprinted from *Fachl. Mitt. österr. Tabakregie*, 1957, No. 1, pp. 7, No. 2, pp. 7, 1958, No. 1, pp. 7, No. 2, pp. 3, and 1959, No. 1, pp. 16, all illus.

e principles underlying the selection, production d storage of tobacco seeds are outlined, and 8 emes of seed production are presented in detail, suitability of each being discussed in relation the needs and conditions found in various acco growing regions of Europe and Asia. e description of each scheme is accompanied diagrams, which show clearly the steps to be en, year by year, to produce "elite" or "super-e" seed. In the more complex schemes programmes lasting 6 to 8 years are needed before superior seed becomes available in commercial quantities.

2415. Steinberg, R. A.
Factors influencing reproduction of some *Nicotiana* species in the greenhouse and field.
Tobacco, N.Y., 1959, **149**(10): 20-4, bibl. 4, illus.

Seasonal responses in the greenhouse with 11 short-day semi-perennial species of *Nicotiana* (Andean group) and 10 typical long-day species, when sowed in March, June, September and December, were related to type and sensitivity to photoperiod. Short-day behaviour of species (Andean group) was checked on an 8-hour day (dark-house). Sensitivity to day-length varied from obligate to day-neutral behaviour among short- and long-day species. Greenhouse propagation at temperatures under 70° F. was necessary (at least from the early bud stage) to ensure reliable seed formation in species of the Andean group and *N. cordifolia*. Preliminary growth on an eight-hour daylength (dark-house) or in the field before shifting to the greenhouse was satisfactory and even advantageous in hastening flowering in the former case. Increased soil volume was found capable of hastening or retarding flowering, depending on species and time of sowing. [Author's summary.]—U.S.D.A., Beltsville, Md.

2416. Mathews, G. R., and Sears, R. D.
Steps to follow if you decide to use chemicals on your fire-cured or sun-cured tobacco to control suckers.
Leafl. Va poly. Inst. Ext. Serv. **82**, revised 1959, pp. 4, illus.

Advice is given on using heavy oil, oil emulsion and, in more detail, maleic hydrazide. The oils should be used at 1–2 c.c. and 3 c.c. (1½ c.c. emulsifiable oil plus 1½ c.c. water) respectively, and the plant should be topped between two nodes. Their use in wet weather can cause injury to the plants. M.H. 30 is used at the rate of 5 pints in 30 gal. per acre of 5,000 plants as a mist spray after topping and removal of the larger suckers. The top leaves should be at least 12 in. long when MH is applied.

Physiology, biochemistry and crop composition.

(*See also* 1536, 1553, 2401-2403, 2406, 2410, 2415, 2438, 2459.)

2417. Zelitch, I.
The relationship of glycolic acid to respiration and photosynthesis in tobacco leaves.
J. biol. Chem., 1959, **234**: 3077-81, bibl. 19.

An inhibitor of glycolic acid oxidase, α-hydroxy-2-pyridine-methanesulphonic acid, which is highly effective when supplied to tobacco leaves, has been described. In the presence of this inhibitor in sunlight, the glycolic acid concentration increases at a rate of at least 18 μmoles per hour per g. of leaf. This rate of accumulation is as large as the rate of oxygen uptake in darkness in all but the youngest leaves, and suggests that this oxidase plays an important role in the respiration of leaves in sunlight, especially in older tissue. The rapid accumulation of glycolic acid in tobacco leaves in light in the presence of the inhibitor has been confirmed in experiments with $C^{14}O_2$. More than 50% of the radioactivity of leaves treated with glycolic acid oxidase inhibitor has been found in the glycolic acid. This suggests that, in the normal leaf in sunlight, more than half of the carbon fixed may be metabolized by this oxidase, and emphasizes the central position of glycolic acid in the processes of respiration and photosynthesis in leaves. [Author's summary.]—Conn. agric. Exp. Stat., New Haven.

2418. Arora, N., Skoog, F., and Allen, O. N.
Kinetin-induced pseudonodules on tobacco roots.
Amer. J. Bot., 1959, **46**: 610-13, bibl. 18, illus.

Tobacco stem segments were cultured on modified White's medium containing 0·02–0·1 mg./l. of kinetin, 2 mg./l. of IAA and 2 g./l. of casein hydrolysate. Roots grew profusely from these stem pieces. In the presence of kinetin, especially when a second supply (0·02 mg./l.) was introduced after the roots had developed, large numbers of pseudonodules were formed along the root surfaces. Although these kinetin-induced pseudonodules arose from cortical tissue, their anatomical structure remained undifferentiated and unspecialized and bore no resemblance to that of typical nodules caused by rhizobia. [From authors' summary.] The structure of these nodules is described.—Univ. Wis., Madison.

2419. Paleg, L. G., and Muir, R. M.
Neutral and acidic auxins in developing tobacco fruit.
Aust. J. biol. Sci., 1959, **12**: 340-3, bibl. 10.

Changes in both auxins following pollination and possible interpretations thereof.

2420. Il'in, G. S.
On the biosynthesis of nicotine. [Russian.]
Fiziol. Rast., 1959, **6**: 474-5, bibl. 6.

Using nutrient solutions, with and without N, but which contained $NaHC^{14}O_3$, it was shown that nicotine in tobacco is a secondary synthetic product not dependent on the uptake of N by the roots.

2421. Binopoulos, X.
Recherches sur une lignée grecque de tabac pauvre en nicotine. (**Research on a Greek tobacco strain with a low nicotine content.**) [English summary 10 lines.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 371-6, bibl. 9.

The low-nicotine tobacco selection T.A.32 can convert nicotine to nornicotine during sun-curing. Investigations have shown that this process starts in the green leaf and is intensified when growing conditions are moist. Neither P nor K fertilizers affected the nicotine content, and N only increased the nicotine content when growing conditions were very dry.—Tob. Inst. Drama, Greece.

2422. Onishi, I.
Recent studies on the tobacco with a low nicotine content. [French summary 15 lines.]
Proc. 2nd int. sci. Tob. Congr. 1958, 1959, pp. 422-5, bibl. 6.

In the Cherry Red strain of the variety Bright Yellow a substantial conversion of nicotine to nornicotine occurred during flue- or sun-curing, but no such conversion occurred in the red-free parent type. Among many other varieties examined only two, Ibusuki and Enshu, showed appreciable conversion and both these possess a reddish colour. In general, nicotine contents were higher in flue-cured than in sun-cured leaves and in detached leaves cured on sticks than in leaves cured by stalk cutting methods.—Centr. Res. Inst., Japan Monop. Corp.

2423. Kuhn, H.
Technique pour le dosage spécifique de la nornicotine. (**A technique for the specific determination of nornicotine.**) [English summary $\frac{1}{3}$ p.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 403-6, bibl. 11.

Nornicotine reacts with isatin in a manner similar to that used for the identification of proline. The intensity of colour developed is proportional to the amount of nornicotine, and this makes quantitative estimation possible. The process takes 45 minutes, and quantities of nornicotine down to 3 γ/ml. of solution can be determined.—Austrian Tob. Monopoly.

2424. Pozsár, B. L.
Ratio of chlorophyll and phaeophytin components in tobacco leaves.
Acta Bot. Acad. Sci. Hungaricae, 1959, 5(1/2): 87-96, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 2,485.

The chlorophyll a and b components in the leaves of commercial varieties of *N. tabacum* and *N. rustica* began to break down before full maturity, the first products of degradation being phaeophytin a and b. The ratio of a and b components of phaeophytin corresponded with that of the chlorophyll components. In *N. tabacum* the phaeophytin content amounted to 25% of the chlorophyll content, and in *N. rustica* to almost 80%.—Nat. Inst. agric. Qual. Testing, Hungary.

425. STEDMAN, R. L., AND RUSANIWSKYJ, W.
Composition studies on tobacco. VIII. Total paraffinic hydrocarbons in aged and fermented tobaccos.
Tobacco, N.Y., 1959, **149**(19): 24-8, bibl. 32.

n improved method of analysis is described, y means of which levels were determined for flue-ured, burley, Maryland, Turkish, fire-cured, and igar tobaccos. Paraffin percentages varied between 24 and 0·43 and were in the same general range total sterols. Flue- and fire-cured types had the west concentrations. [For part VII see *H.A.*, : 3791c.]—E. reg. Res. Lab., Philadelphia.

26. DYMICKY, M., AND STEDMAN, R. L.
Composition studies on tobacco. IX. Campesterol from flue-cured leaves.
Tobacco, N.Y., 1959, **149**(21): 23-6, bibl. 10.

ee campesterol a minor component of the eroidal complement.

27. VOLGUNOV, G. H., PETRENKO, A. G., AND POKHNO, M. T.
Polyphenoloxidase activity in different parts of makhorka plants. [Russian.]
Bjull. n.t. inform. VITIM, 1958, **5**: 25-7, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,635.

lyphenoloxidase was found to be irregularly stributed, leaf plastids containing most. In the lks it was present in the pith and woody parts, t the outer tissues contained an enzyme of low ivity. During fermentation activity was reduced all parts, continuing at a low level in the leaf astids and stalk pith but in other parts being luced to no more than 0·1 ml. O_2 per g. dry tter. [See also *H.A.*, 30: 898.]

28. MIKHAILOV, M. K.
On the specificity of tobacco polyphenoloxidase towards substrate. [English, with Russian summary 9 lines.]
C.R. Acad. bulg. Sci., 1959, **12**: 337-40, bibl. 16.

e polyphenoloxidase of an acetone extract of sh leaves of oriental cigarette tobacco oxidized ious *o*-polyphenols (catechol, chlorogenic and feic acids) more readily than *p*-polyphenols droquinone). The polyphenoloxidase of dried ves, however, while still readily oxidizing the olyphenols present in the leaf (chlorogenic and eic acids) and hydroquinone, was no longer e to oxidize catechol.

9. REID, W. W.
Some aspects of polyphenols of tobacco.
Tobacco, N.Y., 1959, **149**(3): 22-7, bibl. 15, illus.

o of the products of the polyphenolase oxidation chlorogenic acid occur in flue-cured tobaccos. bacco polyphenols may be hydrolyzed enzyma-lly. From hydrolysates of tobacco extracts, caffeic acid, quercetin, scopoletin and kaempferol may be isolated. Scopolin and scopoletin occur even in air- and fire-cured tobaccos. Scopoletin is not oxidized by tobacco polyphenolase, nor by a coupled oxidation with chlorogenic acid. During smoking the majority of the polyphenols are destroyed. In smoke condensate simple phenols, scopoletin and a basic compound fluorescent in the ultraviolet may be detected. [From author's conclusions.]—Res. Dep., Carreras Ltd., London.

2430. WRIGHT, H. E., JR., BURTON, W. W., AND BERRY, R. C., JR.
Soluble browning reaction pigments of aged Burley tobacco. I. The nondialyzable fraction.
Arch. Biochem. Biophys., 1960, **86**: 94-101, bibl. 15.

A dark-brown pigment, identified as an iron-protein-chlorogenic acid-rutin complex, was isolated by precipitation with acetic acid from the soluble nondialyzable fraction of aged Burley tobacco in an amount corresponding to 0·32% of dry leaf weight. The acetic acid-insoluble pigment, an acetic acid-soluble brown pigment of similar qualitative composition and a polysaccharide comprised the total acetone-precipitated nondialyzable fraction. Identification of the natural pigment confirms previous *in vitro* conclusions regarding the participation of chlorogenic acid and rutin in the browning of air-cured tobacco. [From authors' summary.]—Amer. Tob. Co., Richmond, Va.

2431. ZUCKER, M.
Alteration of the protein components and other constituents in the tobacco leaf by shading.
Plant Physiol., 1959, **34**: 563-9, bibl. 35.

Initially, sun leaves developed more slowly biochemically and morphologically than shade leaves, but, when fully grown, sun leaves showed a more active metabolism as measured by accumulation of dry weight, reducing sugars and protein and by the endogenous rate of O_2 consumption. The concentration of certain soluble enzymes in mature sun leaves was almost twice that found in mature shade leaves. However, little difference in specific activity was found, for the concentration of soluble proteins in sun leaves was also correspondingly greater. The disparity in concentration of insoluble leaf proteins was much less. Consequently, sun leaves also had a higher ratio of soluble to insoluble proteins than shade leaves. Indeed, most of the difference in total protein N could be accounted for by the difference between the soluble fractions of the 2 leaf types. Electrophoresis on starch of the soluble proteins revealed further differences in composition. Young shade leaves exhibited only 1 major soluble fraction, whereas young sun leaves contained an additional major peak corresponding in mobility to minor shoulder components in the shade leaf extracts. No difference between the electrophoretic patterns of soluble proteins from mature sun and shade leaves was observed. The findings demonstrate that specific protein fractions in tobacco leaves can be altered selectively by experimentally imposed conditions of growth. [From author's summary.]—Conn. agric. Exp. Stat., New Haven.

2432. Palmer, J. K.
Preparation and partial characterization of the fraction II proteins of the tobacco leaf.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): xiv.

Technique described.

2433. Pearse, H. L.
Variation in chemical composition of South African flue-cured tobaccos according to market value. [French summary 7 lines.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 560-2, bibl. 4.

The partial chemical composition of various quality groups arranged according to market value for flue-cured tobacco grown in the Union of South Africa is given. The better quality tobaccos are lower in nitrogen, protein, nicotine and petroleum ether extract and higher in soluble sugar content than the poorer quality tobaccos. South African flue-cured tobaccos are characteristically exceptionally low in nicotine and petroleum ether extract values. [Author's summary.]—Cent. Tob. Res. Stat., Rustenburg.

2434. Mikhailov, M.
Two new chemico-analytical indices for tobacco qualification. [English, with Russian summary 7 lines.]
C.R. Acad. bulg. Sci., 1959, **12**: 313-16, bibl. 6.

Determinations were made on the flavonoid contents of graded tobaccos from different regions and from samples of different pickings. The flavonoid content was found to decrease as the quality deteriorated in samples from all regions and also as the colour of the leaf darkened. On individual plants it increased from the lower leaves to the tip. A good correlation was obtained between the percentage flavonoid : protein ratio, the Shmuk number (carbohydrate : protein ratio) and the grade.

Disorders, diseases and pests.

(*See also* 1904, 1958, 1971, 2386-2389, 2391, 2395, 2397, 2456, 2460-2463.)

2435. Bailov, D., and Andreitcheva, M.
Recherches sur la nature de la pigmentation du tabac dite "aladza". **(Studies on the nature of the so-called aladza pigmentation of tobacco leaves.)** [English summary 12 lines.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 86-92, bibl. 13.

The term "aladza" is used in Bulgaria to describe blue-green or green spots or streaks on cured tobacco leaves. Investigations have shown that this form of discoloration is not due to TMV infection but is associated with irregular rates of water loss during yellowing and failure to dry the leaves quickly during the final stage of colour fixing. Analysis of leaves of 4 varieties has shown the green spots to be characterized by abnormally high concentrations of chlorogenic acid. Both the pigmented and non-pigmented areas of affected leaves contained much more protein and much less sugar than normal yellow leaves.—Bulgarian Acad. Sci.

2436. Uzunovski, M.
Reaction of tobacco variety Prilep to the occurrence of bassara disease under the conditions of an extremely dry year. [French summary 13 lines.]
Proc. 2nd int. sci. Tob. Congr., 1958, 1959, pp. 286-90, bibl. 7, illus.

The cigarette variety Prilep, which is widely grown in Yugoslavia, has many good points, but is subject to the bassara disease. This disease is difficult to see on growing plants, but shows up during curing as a series of irregular greenish-white spots that sometimes coalesce to cover the whole leaf. Investigations in 1956, a very dry year, indicate that the cause is physiological and largely associated with weather conditions. Apart from the use of non-susceptible varieties, steps which have been found to reduce the incidence of the disorder are adequate manuring, wide spacing, late transplanting, earlier harvesting, and priming early in the morning.—Tob. Res. Inst., Prilep.

2437. Marcelli, E.
Le principali malattie del tabacco. **(The principal diseases of tobacco.)**
Inf. fitopat., 1959, **9**: 230-3, and 261-6, illus.

A review, including infestation by broomrape (*Orobanche* spp.) and control measures for this and various pathogens.

2438. Gerola, F. M., and Vaccari, E.
Ricerche sull'attività dei principali enzimi interessati nel ricambio dell'amido, in piante sane e virosate di *Nicotiana tabacum.* **(Investigations on the activity of the chief enzymes involved in starch metabolism in healthy and virus diseased tobacco plants.)**
R.C. Ist. lombardo, 1955, **88**: 577-81, from abstr. in *Ann. Fac. Agrar. Univ. cattol. S. Cuore*, 1958, **65**: 144.

In healthy tobacco plants the young leaves showed abundant phosphorylase activity, but the older leaves were richer in amylases. In diseased plants amylase activity was greater, and phosphorylase activity less, in the green areas than in those of healthy controls, but ageing leaves of diseased plants were high in phosphatase, amylase and phosphorylase.

2439. Tobacco Research Board of Rhodesia and Nyasaland.
A reminder about anthracnose.
Rhod. Tobacco, 1959, No. 19, p. 5.

Control measures include seedbed treatment with methyl bromide or zineb and spraying with thiram, zineb or maneb.

2440. Minev, K.
Cultural and chemical measures in the control of tobacco powdery mildew, *Erysiphe cichoracearum* D.C. [Yugoslav, with English summary 1 p.]
Annuaire Fac. Agric. Sylvic. Skopje, 1957/1958, 1958, **11**: 247-57, bibl. 17.

See *H.A.*, 30: 877.

2441. Thomson, R., and McLeod, A. G.
Verticillium wilt of tobacco. I. A new disease of tobacco caused by *Verticillium dahliae* Kleb.
McLeod, A. G., and Thomson, R.
Idem. II. Field and glasshouse trials to determine resistance of varieties and species to *Verticillium dahliae* Kleb.
N.Z. J. agric. Res., 1959, **2**: 785-91, bibl. 5, illus., and 792-6, bibl. 2.

The wilt is described and the extent of the affected areas defined. Soil treatment with either chloropicrin or methyl bromide controlled the disease, but their use is uneconomic except for eliminating small centres of infection. No cultural or rotational treatment tried reduced the amount of infection sufficiently to suggest a method of control. No varieties or species showed immunity, but 2 varieties, Ky 34 and TI 448 A, appeared to have a degree of resistance. [From authors' summaries.]—Tob. Res. Stat., D.S.I.R., Motueka.

2442. Dominick, C. B.
Feeding of overwintered tobacco flea beetles and first brood emergence following soil treatment with insecticides.
J. econ. Ent., 1959, **52**: 753-4, bibl. 4.

Granulated aldrin, chlordane and heptachlor worked into the soil 3 weeks before planting were ess effective in preventing foliage damage to tobacco by *Epitrix hirtipennis* than the standard DDT foliage spray applied in the seed-bed before ifting for planting out. The 3 insecticides gave similar results, and no significant difference was observed in plots treated with aldrin and heptachlor at 3 and 6 lb./acre. All 3 materials were highly effective in preventing the emergence of the first brood adults on two soil types. [See also *H.A.*, 28: 1590.]—Va agric. Exp. Stat., Chatham.

2443. Kurup, A. R., and Joshi, B. G.
Laboratory and field tests of insecticides and application methods for the control of ground beetles attacking tobacco.
Indian Tobacco, 1959, **9**: 169-74, bibl. 5, illus.

In field tests over 2 years dieldrin, 50% w.p. or 1% dust, was the most toxic compound used against *Mesomorphus villiger*, *Sceleron latipes* and *Opatroides frater*, followed by chlordane, aldrin and endrin. The insecticide was more effective when applied in the transplanting water than when mixed with fertilizer a week before transplanting, and most lethal when applied in both.—Cent. Tob. Res. Inst., Rajahmundry.

2444. Farrier, M. H., Guthrie, F. E., and Rabb, R. L.
Tobacco foliage loss to hornworms and budworms in North Carolina, 1957 and 1958.
J. econ. Ent., 1959, **52**: 761-2, bibl. 11.

A stratified sampling technique, developed to compensate for variations in tobacco acreages by counties, is described. By this means the losses sustained by flue-cured and burley crops through first and second broods of hornworms, *Protoparce sexta* and *P. quinquemaculata*, and budworms, *Heliothis virescens* and *H. zea*, have been estimated. —N.C. agric. Exp. Stat., Raleigh.

2445. Guthrie, F. E., Rabb, R. L., and Bowery, T. G.
Evaluation of candidate insecticides and insect pathogens for tobacco hornworm control, 1956-1958.
J. econ. Ent., 1959, **52**: 798-804, bibl. 14.

Comparative contact toxicity tests in the laboratory indicated the following descending order of effectiveness against *Protoparce sexta*: Guthion = DDVP>endrin = Dipterex = Shell SD 4402 (octachloro-tetrahydromethanophthalan) > Thiodan = Sevin > Chlorthion, Delnav, ethion and Trithion. In field tests Thiodan, Sevin, SD 4402 and Dipterex gave larval control comparable to endrin. Guthion gave poorer results than endrin at comparable concentrations but was effective at higher dosages. All materials were about equal in reducing hornworm damage 9 days after treatment, but Guthion and Dipterex permitted more damage than the others 22 days after treatment. During flue curing 85% of the residues dissipated. With the exception of Sevin the materials did not affect the flavour of cured tobacco. *Bacillus thuringiensis* was as effective in preventing hornworm damage as endrin but slower in action. It was not harmful to the parasite *Polistes exclamans*. [From authors' abstract. See also *H.A.*, 30: 884.]—N.C. agric. Exp. Stat., Raleigh.

2446. Tappan, W. B.
Two years' results with Sevin for hornworm control on shade-grown cigar-wrapper tobacco.
Stat. to Stat. Res. News, 1959, **5**(2): 1-2, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,729.

In trials against *Protoparce* spp. the percentages of plants which remained free from attack were as follows: 10% Sevin, 96%; 2% endrin, 96%; 10% DDT + 6·5% zineb, 94%; 10% TDE + 6·5% zineb, 92%; and control 85%. All were applied as dusts in weekly doses of 12–20 kg./ha. Sevin had no harmful results and left no visible residue; the larvae were killed on emergence.

2447. Patel, H. K., Patel, R. C., and Patel, R. M.
Life history, epidemiology and seasonal history of tobacco stem borer (*Gnorimoschema heliopa* Low).
Indian Tobacco, 1959, **9**: 175-84, bibl. 12.

Including a note on parasitization.

2448. Todorovski, B., and Mickovski, J.
Trials of some BHC insecticides and their effect on the tobacco plant. [Yugoslav.]
Tutun, 1958, pp. 272-82, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,725.

Products containing BHC (Bentox-20, Agrocide-7, lindane 1%) applied on seedbeds at the rate of 5 mg./m^2 before sowing were ineffective. When applied as dusts to seedlings or field plants they induced various deformations of leaves and terminal buds.

Harvesting, curing, fermentation and storage.

(*See also* 2435, 2436.)

2449. Derevenko, V. V., and Florencev, E. I.
Progress in the development of a tobacco-harvesting machine. [Russian.]
Tabak, 1959, **20**(4): 39-41, illus.

A prototype machine is described which harvests 83 kg. of tobacco leaves in 1 hr. when travelling at a speed of 0·71 km./hr. Harvesting was done 4 times faster than by hand. The cutting mechanism consists of a chain fitted with knives. The angle of the chain is adjusted according to the height of the leaves to be harvested. The cut leaves are collected either by suction or by a continuous belt.

2450. Peens, J. F.
How to build a flue-curing barn.
Fmg S. Afr., 1959, **35**(9): 53-6, illus.

A diagramatically illustrated account, giving dimensions, materials, construction and output.

2451. Peens, J. F.
Construction of an air-curing barn.
Fmg S. Afr., 1960, **35**(10): 33-5, illus.

Structures suitable for both light and dark tobaccos, including burley.

2452. Anon.
All-steel fire-resistant curing barns developed.
Tobacco, N.Y., 1959, **149**(19): 34-5, illus.

These buildings are being produced commercially in a range of sizes from 16 × 16 × 17½ ft. upwards and have full ridge adjustable ventilation. Units are shipped complete and can be erected by unskilled labour.

2453. Panov, P. C., and Bojanov, B. I.
The use of infra-red rays for tobacco drying. [Russian.]
Tabak, 1959, **20**(4): 50-3, illus.

Experiments in Bulgaria with infra-red ray drying showed that the cost may be as much as 30% lower than with the heat method. When partially yellowed leaves were dried, the optimum conditions were provided when the leaf temperature reached 60° C. from a source temperature of 850–930° C., and with the R.H. kept at a minimum. Under these conditions it took 20 min. to dry all eastern varieties and 30 min. to dry Virginia-type tobaccos. Chemical analysis showed that leaves dried with infra-red rays contained 16% more nicotine and 20% more carbohydrates than sun-dried tobacco. Flavour and aroma were also superior in infra-red dried leaves [see also *H.A.*, 29: 618]. A detailed description of the method and the apparatus is given.

2454. Petrenko, A. G., and Nalivko, G. B.
High temperatures in the usual methods for drying tobaccos and makhorkas. [Russian.]
Bjull. n.t. Inform. VITIM, 1958, **5**: 60-7, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,809.

Four methods of drying were compared, viz. at high temperature in drying tunnels with artificially heated air; sun drying; shade drying; and drying in a closed room. The first method reduced drying time to between ½ and ⅕ and resulted in quality as good as that of sun-cured tobacco. The respective figures for composition of the 4 samples were as follows: nicotine percentage 1·52, 1·45, 1·56 and 1·49; percentage of reducing substances 8·49, 7·62, 7·79 and 8·3; sugar percentage 4·26, 4·34, 4·22 and 4·25; percentage of polyphenols 4·23, 3·28, 3·57 and 4·05. The phenoloxidase activity indices were 0·11, 0·11, 0·12 and 0·09.

2455. Jovanovski, D., and Boceski, D.
Effect of tobacco compression on the fermentation process. [Yugoslav.]
Tutun, 1959, pp. 265-72, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,806.

Two pressures were used, viz. 320 and 384 kg./sq. m. No differences in the progress or results of fermentation were observed; compression had no effect on hygroscopicity, and the fermentation was uniform in both cases. The heavier pressure, however, resulted in a smaller loss of weight during fermentation and in improved storage capacity.

2456. Svirin, I. K.
Comparative assays of fermentation at 60° and 50° C. [Russian.]
Bjull. n.t. Inform. VITIM, 1958, **5**: 48-54, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,811.

Fermentation in bales at 50° and 60° C. was compared for 3 varieties. There were no differences in composition and characteristics, but fermentation at 60° took 20–40% less time and resulted in slightly inferior quality and aroma. It also eliminated *Lasioderma* infestation.

2457. Petrenko, A. G.
Changes in the chemical composition and quality of Pomorskaja makhorka during fermentation in bulk and bales. [Russian.]
Bjull. n.t. Inform. VITIM, 1958, **5**: 35-42, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,808.

Fermentation took place in bulks of 2·5 × 1·5 × 1·8 m. and in bales of 30 kg. There were no differences in quality, strength and colour, but the outer parts of the bulks were somewhat drier than the centres and the aroma of the baled tobacco was less than that of the bulked tobacco. The nicotine contents were 0·86% for the bulks and 0·91% for the bales.

2458. Petrenko, A. G., D'jachkin, I. L., and Ocherov, C. I.
Changes in the chemical composition and quality of Hamous makhorka during industrial fermentations at 50 and 60° C. [Russian.]
Bjull. n.t. Inform. VITIM, 1958, **5**: 28-34, from *CORESTA Inf. Bull.*, 1959, No. 3, Abstr. 2,807.

Compared with natural fermentation the makhorka fermented at high temperature contained 1·5% more nicotine and 3% more total N (D.M.). It also had a lower water content and better aroma. There was no difference between fermentation at 50 and 60° C., and the latter temperature particularly suited makhorkas of high nicotine content.

2459. Giovannozzi-Sermanni, G.
Studi sulla fermentazione dei tabacchi. XVII. Variazioni . . . **(Studies on the fermentation of tobacco. XVII. Changes in the organic acids and amino acids in Kentucky tobacco during fermentation for the production of Toscani cigars induced by the microorganisms responsible for the fermentation and analysis of the gases evolved during the process.**
Tabacco, 1959, **63**: 149-60, bibl. 14, illus.

Fermentation was obtained in the laboratory by the use of *Debaryomyces nicotianae*, *Micrococcus nicotianae*, *M. nicotianae* var. *liquefaciens*, a *Bacillus* sp. and *Arthrobacter nicotianae.* During the process the tobacco changed from acid to alkaline, and citric, malic, maleic and succinic acids were destroyed. The amino acids were increased by *D. nicotianae* and utilized by *M. nicotianae*, and carbon dioxide, ammonia, propane and propene were produced.

2460. Whitney, J.
How tobacco is protected against infestation in tropical climate.
Tobacco, N.Y., 1959, **149**(22): 14-15, illus.

Details of warehouse ventilation and of storage insect control by spraying, methyl bromide fumigation and the use of light traps.

2461. Tracy, R. L., and McClellan, W. C.
Experiences with Herkol in tobacco warehouses.
Tobacco, N.Y., 1959, **149**(3): 11, 32-3.

Herkol (0,0-dimethyl-2,2-dichlorovinyl phosphate) is an effective fumigant, relatively low in health hazards. A minimum dose is 1 g. per 1,000 cu. ft. thrice weekly. Details of its use and effects are given.

2462. Kurup, A. R., and Parkhe, D. P.
Studies on the seasonal occurrence of cigarette beetle under warehouse conditions.
Indian Tobacco, 1959, **9**: 93-6.

Pupal and adult populations of *Lasioderma serricorne* inside bales.

2463. Parkhe, D. P., and Kurup, A. R.
Tests on modified vertical suction light trap and various other types of traps for the cigarette beetle (*Lasioderma serricorne* F.) in the tobacco godowns.
Indian Tobacco, 1959, **9**: 97-9, illus.

Of 5 types of light trap tested a vertical suction trap with 4 baffle plates (dividing the light into 4 compartments), one light and one fan was the most efficient. Of the traps without fans a vertical trap without baffles and with one light was best. —Cent. Tob. Res. Inst., Rajahmundry.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS

Condiment and spice plants.

(*See also* 1534, 2123, 2125, 2798, 3070.)

2464. Varma, P. M.
Information of "katte" disease of cardamom for cultivators.
Arecanut J., 1959, **10**: 7-16, illus.
Recommendations for the control of this mosaic virus disease include roguing and the replanting of infected gardens with plants grown from seed. The vector is the black banana aphid. Both local varieties in N. Kanara are susceptible.—Plant Virus Res. Stat., Poona.

2465. Tabin, S., and Płotnicki, J.
Wpływ terminów cięca liści na plon i skład chemiczny cykorii (*Cichorium intybus* L.). **(The influence of the dates of cutting the leaves on the yield and chemical composition of chicory (*C. intybus*).)** [English and Russian summaries 1½ pp. each.]
Ann. Univ. M. Curie-Skłodowska, Sect. E, 1957 (issued 1959), **12**: 379-401, bibl. 22.
Chicory leaves were cut for fodder either on August 25-26 and October 11-12, or only on October 11-12. The frequency of cutting had no appreciable effect on the chemical composition of the roots, but cutting in August reduced the yield of the roots by about 30%.

2466. Nikam, B. G., Pawar, F. K., and Kulkarni, S. N.
Coriander is M.P.'s dollar-earner.
Indian Fmg, 1959, **9**(7): 11-12.
Types grown, culture and economics in Madhya Pradesh where it occupies 120,000 acres.

2467. Joshi, N. C.
Powdery mildew of *Foeniculum vulgare*. I.
Agra Univ. J. Res., 1958, **7**: 87-91, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-79.
Cured by sulphur dusting at initial flowering, at full bloom and at seed formation.

2468. Meenakshi, S.
Ginger earns good income for the West Coast.
Indian Fmg, 1959, **9**(4): 12-13, illus.
Culture and curing in Malabar and S. Kanara.

2469. Vaughan, J. G., and Hemingway, J. S.
The utilisation of mustards.
Econ. Bot., 1959, **13**: 196-204, bibl. 29.
Descriptions and uses of *Brassica nigra*, *B. juncea*, *Sinapis alba*, *S. arvensis*, *Eruca sativa* and oriental *Brassica* spp.

2470. Sen, B., and Joshi, H. C.
Effect of irradiation with thermal neutrons on control and vernalised seeds of mustard.
Agron. J., 1959, **51**: 460-2, bibl. 11, illus.
Irradiation of seed caused increased mortality of seedlings and diminution in lengths of their hypocotyls and roots. It did not destroy the effect of vernalization. Only 22 mutants were found in 1,331 F_3 progeny of irradiated seed. [Authors' abstract.]—Vivekananda Lab., Almora, U.P., India.

2471. U.S. Dep. Agric., Foreign Agricultural Service.
Black and white pepper: world production and trade.
Foreign Agric. Circ. U.S. Dep. Agric. **FTEA 2-59**, 1959, pp. 10.
1958 world production estimated at 147 m. lb., 14% below the 1957 estimate.

2472. Patnaik, S.
Photoperiodic response of *Curcuma longa* Linn.
Sci. and Cult., 1960, **25**: 433-4.
Bulbs of the turmeric variety Betul were planted in pots and grown under 4-, 8-, 10- and 24-hour photoperiods and at normal day lengths. Plants appeared to respond to the 8-hour treatment, the mean height, number of leaves and time of flowering being similar in the 8-hour and control plants. Plants grown under photoperiods of 4, 10 and 24 hours did not flower. The 24-hour treatment produced the greatest height, number of leaves, leaf area and number of sprouts per plant. —Turmeric Res. Stat., G. Udayagiri (Orissa).

2473. Srivastava, B. K.
***Stegobium panicum* as a pest of stored turmeric, in Rajasthan, India, and its control by fumigation.**
FAO Plant Prot. Bull., 1959, **7**: 113-14.
A mixture of ethylene dibromide (5%) and carbon tetrachloride (95%) at 8 lb. per 1,000 cu. ft. proved the most effective fumigant, the mortality percentage among imagos, pupae, larvae and eggs being 100, 55·8, 97·4 and 78·9 respectively.—Rajasthan Coll. Agric., Udaipur.

2474. Burchfield, H. P., and Prill, E. A.
Characterization of vanilla and other plant extracts by paper chromatography.
Contr. Boyce Thompson Inst., 1959, **20**: 251-63, bibl. 5, illus.
Including possible adulterants.

Drug plants.

(*See also* 2553, 2798, 3017.)

2475. Hérisset, A.
La production des plantes médicinales en Anjou. **(The production of medicinal plants in Anjou.)**
J. Agric. trop. Bot. appl., 1959, **6**: 151-60, bibl. 5.
Notes on wild and cultivated species, including the

growing of chamomile (*Anthemis nobilis*), peppermint (*Mentha piperita*), balm (*Melissa officinalis*), hyssop (*Hyssopus officinalis*), belladonna (*Atropa belladonna*), absinth (*Artemisia absinthium*), *Rosa gallica* and castor beans (*Ricinus communis*).

2476. Swanholm, C. E., St. John, H., and Scheuer, P. J.
A survey for alkaloids in Hawaiian plants. II.
Pacific Sci., 1960, **14**: 68-74, bibl. 3.

A continuation of Part I of the series [*H.A.*, 29: 3796], using the same methods. Examination of 29 additional species representing 26 genera and 23 families indicated that 5 species contain alkaloids. Further investigation of different plant parts of 18 of the species covered by Part I has added 1 species to the list of plants containing alkaloids.

2477. Simes, J. J. H., and others.
An Australian phytochemical survey. III. Saponins in Eastern Australian flowering plants.
Bull. C.S.I.R.O. Aust. **281**, 1959, pp. 31, bibl. 31.

Spot tests and confirmatory laboratory extractions were made of 1,136 species from 45 families and the results are grouped according to the compounds found therein. One family of monocotyledons and 13 of dicotyledons were found to be outstandingly rich sources of saponins. There seemed to be little or no taxonomic association between saponins and alkaloids when their plant sources were compared. The occurrence of both in the same species e.g. certain species of *Solanum*, is rare, and in alkaloid- and saponin-rich families different genera and species are usually involved. [For surveys of plants for alkaloids see *H.A.*, 20: 3028 and 23: 3252.]

2478. Rudat, K.-D.
Über antibiotisch wirksame Inhaltsstoffe höherer Pflanzen, insbesondere der Knoblauchsrauke (*Alliaria officinalis*) und anderer Lauchgewächse gegenüber *Bacterium pyocyaneum*. **(On the antibiotically active substances of higher plants, especially of garlic and other types of onion, against *Bacterium pyocyaneum*.)**
J. Hyg. Epidemiol. Microbiol. Immunol., 1957, **1**: 213-24, illus., from *Biol. Abstr., Sect. D*, 1959, **33**: Abstr. 7,395.

A number of plants, particularly from the Cruciferae, Liliaceae and Tropaeolaceae, were examined for the presence of anti-bacterial agents. Volatile substances from the juice of certain garlic-like plants had inhibitory effects on gram-negative bacteria. The most promising species were *Alliaria officinalis* in particular and *Allium sativum* and *Cochlearia armoracia*.—Univ. Berlin.

2479. Chládek, M., and Mestenhauser, A.
Chamomilla bohemica. **(Bohemian chamomile.)**
Pharmazie, 1958, **13**: 297-9, bibl. 14, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 11,408.

The production of volatile oil in *Matricaria chamomilla* [*Anthemis nobilis*] was not associated with heat, air or soil dryness or sunshine but was best in a moderate and varied climate. In Czechoslovakia a polyploid has been developed bearing larger high yielding inflorescences. [See also *H.A.*, 29: 644.]—Czech. Acad. Sci., Res. Stat. Pohořeslice and Opava.

2480. Bayer, I., Katona, K., and Tardos, L.
Beiträge zum Cholingehalt der Blüten von *Matricaria chamomilla* L. **(On the choline content of the flowers of *Matricaria chamomilla* [= *Anthemis nobilis*].)**
Naturwissenschaften, 1958, **45**: 629, bibl. 7.

2481. Quilici, V.
Il contenuto in atropina di *Atropa belladonna* di varie provenienze italiane nell'intento di una selezione di ceppi fisiologicamente più attivi. **(The content of atropine in *Atropa belladonna* from various Italian sources, in a trial selection of the more physiologically active strains.)**
Nuovo G. bot. ital., 1958, **65**: 16-22, bibl. 11.

In general, the atropine content of the leaves was about average (0·3%), but 3 specimens, each from different regions, had the very high values of 0·58, 0·62 and 0·65%.—Ist. bot. Univ. Firenze.

2482. Rapoport, H., and Holden, K. G.
Isolation of alkaloids from *Balfourodendron riedelianum*. The structure of balfourodine.
J. Amer. chem. Soc., 1959, **81**: 3738-43, bibl. 15.

B. riedelianum, a small rutaceous tree, provides extracts used for medicinal purposes in South America.

2483. Anon.
Senna today.
Chem. and Drugg., 1959, **172**(4151): 37-40, illus., from *Trop. Abstr.*, 1959, **14**, Abstr. g2869.

A review of the cultivation of Tinnevelley senna (*Cassia angustifolia*) in India and of Alexandrian senna (*C. acutifolia*) in Africa, their importance as a commercial drug and some data on active constituents in pods and leaves.

2484. Henneberg, M.
Quantitative analysis of senna leaf by chemical methods.
Biul. Inst. Roślin Leczniczych, 1959, **5**(1): 1-10, from *Analyt. Abstr.*, 1959, **6**, Abstr. 4,936.

Two methods compared.

2485. FAIRBAIRN, J. W., AND CHALLEN, S. B.
The alkaloids of hemlock (*Conium maculatum* L.). Distribution in relation to the development of the fruit.
Biochem. J., 1959, **72**: 556-61, bibl. 15, illus.
In a wet season (1956) the maximum content of γ-coniceine in the fruit was almost as great as that of coniine, whereas in a dry season (1955) it was much lower. In both seasons its peak preceded that of the coniine by a fortnight. The maximum total alkaloid content occurred 3 weeks after the fertilization of the ovule.—School Pharm., Univ. London.

2486. CARRERAS MATAS, L.
El glucósido del *Cytisus commutatus.* **(The glucoside from *C. commutatus.*)**
Farmacognosia, 1959, **19**: 1-6, bibl. 4.
The flavonic glucoside isolated from *Cytisus* (*Sarothamnus*) *commutatus* had a different molecular structure from that of the subspecies *merinoi*, but the constituents were alike in other respects.

2487. STOLL, A.
The cardiac glycosides of *Digitalis*.
Chem. Ind. Lond., 1959, No. 50, pp. 1558-67, bibl. 74, illus.
A detailed review.

2488. MASUDA, J. Y., AND HAMOR, G. H.
Effects of gibberellins on alkaloid content of *Hyoscyamus niger*.
J. Amer. pharm. Ass., sci. Ed., 1959, **48**: 361, from abstr. in *J. appl. Chem.*, 1959, **9**: ii-478.
The total alkaloid content of stem and leaves was reduced.

2489. MATOS, F. J. A.
Contribution to the pharmacognostic study of tubers of *Operculina alata*, one of the jalaps of Brazil.
Trib. Farm. Curitiba, 1958, **26**: 145-55, bibl. 9, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 5,793.
Botany and morphology described; resin contents averaged 9·66%.

2490. KLEINSCHMIDT, G., AND MOTHES, K.
Zur Züchtung eines Arzneimohns (*Papaver somniferum*). (Vorläufige Mitteilung.) **(Cultivation of a medicinal opium poppy (*Papaver somniferum*). Preliminary communication.)**
Pharmazie, 1958, **13**: 357-60, bibl. 16, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 11,426.
The alkaloid yield of poppy strains rich in morphine was dependent on climate. In 1953, a good year, 40% of the strains had morphine contents in the capsules of 0·2–3%. In a bad year of high rainfall and little sunshine 80% of the strains tested had morphine contents below 0·2%. Lateral capsules contained 20% less morphine than terminal capsules.—Arbeits. f. Biochem. Pfl., Halle/Saale.

2491. LECAT, P.
Effets des pulvérisations d'hydrazide maléique et de sulfate de potasse sur la teneur en morphine des capsules du pavot-oeillette (*Papaver somniferum nigrum*). **(Effects of sprays of maleic hydrazide and of potassium sulphate on the morphine content of poppy capsules.)**
C.R. Acad. Agric. Fr., 1959, **45**: 592-4.
Rows of plants, 25 m. long, were treated in 1958. The morphine contents of the capsules were: 2·60 and 2·61 g. in the controls; 3·45 and 3·52 g. with 1 application of 4 g. 30% MH per l. water; 1·27 and 1·67 g. with 2 similar applications of MH at an interval of a week; 3·00 and 3·33 g. with a 2% K_2SO_4 solution; and 3·78 and 4·07 g. with 1% K_2SO_4 plus 2% MH. In 2 earlier tests 2 foliar sprays of 2% K_2SO_4 before flowering raised the morphine content from 4·10 to 5·15‰ and from 3·60 to 5·10‰.

2492. PFEIFER, S.
Über die quantitative Erfassung der wichtigsten Mohnalkaloide im Mikromassstab. **(The quantitative determination of the most important opium poppy alkaloids on a microscale.)**
Pharmazie, 1958, **13**: 100-9, bibl. 52, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 11,431.
Methods of determination described and literature on occurrence and biosynthesis reviewed.

2493. MIRAM, R., AND PFEIFER, S.
Über den Gehalt von Mohnpflanzen an Narkotolin. **(The narcotoline content of poppy plants.)**
Naturwissenschaften, 1958, **45**: 573, bibl. 8.
Narcotoline is the main alkaloid in 2–4-week-old poppy plants.

2494. LEETE, E.
The biogenesis of morphine.
J. Amer. chem. Soc., 1959, **81**: 3948-51, bibl. 14.
See also *H.A.*, 28: 3867.

2495. CYBURA, R., AND TOMCZK, H.
Polemonium coeruleum L. surowiec saponinowy. **(*Polemonium coeruleum* as a raw material of saponin.)** [Polish, with Russian and English summaries.]
Diss. Pharmaceut., 1958, **10**: 109-14, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 8,598.
Haemolytic indices are given for the roots, leaves and seeds of *P. coeruleum*, considered to be a valuable source of saponin.

2496. CHATTERJEE, S. K.
Treatment of ipecac cuttings with hormones and some minerals.
Sci. and Cult., 1959, **25**: 318, bibl. 2.
The rooting of cuttings of *Psychotria ipecacuanha*

was greatest when they were treated with a normal nutrient solution to which 50 p.p.m. NAA was added. Cuttings treated with normal solutions deficient in Fe, K, P, Mg or Ca, respectively, all showed less rooting, although in all cases they were better than the control.—Res. Sect., Cinchona Direct., Mungpoo.

2497. van Tamelen, E. E., Aldrich, P. E., and Hester, J. B., Jr.
The stereochemistry of the ipecac alkaloids.
J. Amer. chem. Soc., 1959, **81**: 6214-21, bibl. 24.

Emetine and related ipecacuanha alkaloids.

Essential oils.

(*See also* 2479, 2740, 2798, 3046, 3071.)

2498. Ragimov, M. A.
The biology of flowering and fruit ripening in *Caropodium*. [Russian.]
Tr. In-ta Bot. AN Azerb.SSR, 1957, **20**: 97-109, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,900.

The essential oil of *C. platycarpum* seed contains up to 70% linalool.

2499. Nikolaev, A. G.
Essential oils of *Chenopodium* species. [Russian.]
Uč. Zap. Kišinevsk. Un-t, 1957, **28**: 83-97, bibl. 48, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,397.

The ascaridole content of the essential oil of *Chenopodium ambrosioides* was 77–86%, of *C. chilense* 76–83%, of *C. suffruticosum* 59–73%, of *C. anthelminticum* 60–72% and of *C. integrifolium* 25–36%.

2500. Herrero, J.
Ensayos sobre propagación de *Juniperus thurifera* L. (**Propagation experiments on *Juniperus thurifera*.**) [English summary ¼ p.]
An. Estac. exp. Aula Dei, 1959, **6**: 94-105, bibl. 8.

Cuttings of savin (*Juniperus thurifera*) were extremely difficult to root, despite the use of hormones. The only 2 cuttings which rooted satisfactorily out of hundreds involved were taken in May, with the plant in the ericoid condition, and treated with IAA at 0·5 g./l. Germination of seeds was highest after 3 months' stratification at 12–30° C. followed by a further 3 months at 5° C.

2501. Kulkarni, V. G.
The red-stemmed lemongrass comes to Kumta.
Indian Fmg, 1959, **9**(5): 39.

In the second year of a trial in Mysore, this strain obtained from Kerala, gave a yield of 45 lb. of oil per acre with a citral content between 70 and 85%. During the rainy season the yield of oil amounted to 0·2 to 0·3% of the fresh weight yield of grass, but in the summer the yield of oil rose to 0·4 to 0·5%.

2502. Panadero, M.
Estudio de la menta japonesa cultivada en España. (**A study of the Japanese mint cultivated in Spain.**) [English summary ¼ p.]
Farmacognosia, 1959, **19**: 225-53, bibl. 24, illus.

Mentha arvensis var. *piperascens* has shown promise as an essential-oil crop in the Madrid area. Details are given of cultivation, disease control, harvesting, distillation and the chemistry of the extracts. Yields of essential oil were highest immediately before and during the early part of the flowering period.

2503. Čitanava, Ju. E.
***Pancratium maritimum* as an essential oil plant.** [Russian.]
Tr. Vses. n.-i. In-t sint. i natur. duš. Veščestv, 1957, No. 3, pp. 97-103, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,906.

The essential oil of *P. maritimum* was found suitable for perfumery. Cultivation on alluvial soils resulted in low flower yields, but on soils containing ½ or ⅓ sand yields similar to those on beach sand were obtained. For propagation the use of large bulbs, 4·2–7·0 cm. in diameter, is recommended.

2504. Brooker, E. G.
Constituents of *Phyllocladus glaucus*.
N.Z. J. Sci., 1959, **2**: 212-14, bibl. 12.

The leaves of this small tree contain phyllocladene. The aerial bark and the root bark contain acetic and ferulic acid esters of the bimolecular compound of ceryl and ligno-ceryl alcohols.—Dep. Chem., Univ. Auckland.

Fibres.

(*See also* 2798, 3046.)

2505. Seale, C. C., Joyner, J. F., and Pate, J. B.
Agronomic studies of fiber plants.
Bull. Fla agric. Exp. Stats **590**, 1957, pp. 27, bibl. 54, illus., [received 1959].

An account is given of a jute variety trial, a hard-fibre variety trial with sisal, henequen, *Furcraea gigantea* and *F. cabuya*, and a hemp seed production experiment. Brief mention is also made of limited trials on *Abroma augusta*, *Crotalaria juncea*, *Linum usitatissimum*, *Musa textilis*, *Phormium tenax* and *Urena lobata*. None of these plants has so far been grown commercially in Florida.

2506. Atal, C. K.
Sex reversal in hemp by application of gibberellin.
Curr. Sci., 1959, **28**: 408-9, bibl. 6, illus.

Hemp (*Cannabis sativa*) plants were sprayed at weekly intervals from the 4-leaf stage until flowering with 100 p.p.m. of GA. Treated female plants at first produced male flowers and only in later-formed axils did female flowers appear. On male plants GA did not affect sex but increased the number of flowers formed.—Punjab Univ., Amritsar.

2507. Špaldon, E., and Marek, J.
Klíčivosť pel'u konopí. (**The germination of hemp pollen.**) [English and Russian summaries ⅓ p. each.]
Sborn. vys. Šk. pol'nohosp. v Nitre, agron. Časť, 1958, pp. 83-94, bibl. 9.

On a 1·5% agar + 5% sucrose medium the germination of the pollen of 15 monoecious and dioecious varieties ranged from 0·62 to 70·02%.

2508. Ferri, F.
Prove di lotta sulla canapa control la *Pyrausta nubilalis*. (**Experiments on control of *Pyrausta nubilalis* on hemp.**)
Progr. agric., 1959, **5**: 1259-66, illus.

Very good control of the pest was achieved by spraying 13–15 days after emergence of the first adults, and again 10–13 days later, with either Didifos 50 (DDT + parathion) or with endrin. Parathion alone was slightly less effective.—Ist. Pat. veg., Univ. Bologna.

2509. Špaldon, E., and Láskoš, J.
Vplyv času zberu na úrodu a akosť stoniek a vlákna konopí (*Cannabis sativa* L.). (**The effect of harvest date on the yield and quality of hemp straw and fibre (*C. sativa*).**) [English and Russian summaries ⅓ p. each.]
Sborn. vys. Šk. pol'nohosp. v Nitre, agron. Časť, 1958, pp. 71-82, bibl. 11, illus.

The hemp variety Šumperská Alfa was harvested at the beginning and at 25, 50, 75 and 100% anthesis of male plants. The yield of straw was highest from crops harvested when all the male plants were in flower. Both yield and quality of the fibre were highest from crops harvested when 75% of the male plants were in flower.

2510. Romero Manrique, A.
El fique, su importancia en la agricultura y en la industria. (**Sisal and its importance in agriculture and industry.**)
Agric. trop. Bogotá, 1959, **15**: 322-5.

Production in Colombia and use for erosion control.

2511. Diekmahns, E. C.
Hybrid sisal—a revolution in estate management?
Bull. Kenya Sisal Bd, 1959, **30**: 16-17, illus., from *Trop. Abstr.*, 1960, **15**, Abstr. h172.

Hybrid No. 11648 from Tanganyika, a cross between *Agave amaniensis* and *A. angustifolia*, produces 560 or more leaves and has an estimated yield of 35–40 tons fibre per ha. This promising strain may, however, take 15 or more years to become widely planted in East Africa.

Hops.

(*See also* 3065, 3071.)

2512. Association of Growers of the New Varieties of Hops (A.G.N.V.H.).
Annual booklet 1959, 1959, pp. 56, price to non-members 5s.

Among the articles in this booklet is the latest "summary of the present position" regarding hop varieties in the U.K., by C. L. Jary and F. H. Beard; three articles on hop diseases and wilt-tolerant hops [reprinted from the *Annual Report of East Malling Research Station for 1958*]; and "the effect of some cultural factors on growing hops for the picking machine", by F. C. Thompson.

2513. Sykes, J. T., and Williams, I. H.
Factors affecting regeneration from cuttings using mist technique.
From abstr. in *Ann. appl. Biol.*, 1959, **47**: 631-4, illus.

With a wide range of species no consistent relationship was found between speed of rooting and the presence or absence of a heel on the cutting. The rooting capacity of various types of hop cutting is discussed: mid-cuts or 2-node cuttings from which the lower leaves had been removed rooted most readily. Bottom heat at 70–75° C. improved rooting. Varying the illumination gave inconclusive results.—Wye Coll., Kent.

2514. Nash, A. S., and Mullaney, P. D.
Commercial application of gibberellic acid to hops.
Nature, 1960, **185**: 25, bibl. 3.

Preliminary experiments are described in which the K salt of GA was used to reduce the length of the burr stage in the growth of triploid hops and to increase yield. The optimum time of application was found to be when the stigmas of the female flowers were ⅛ in. or more in length. The optimum concentration was 50 p.p.m., but 12·5 p.p.m. was considered likely to be the most economic. Then, in a full scale field trial, GA was applied through the overhead irrigation system at a pressure of rather less than 30 lb./sq. in. The variety used was Pride of Ringwood. Yields were increased from 5·2 to 7·25 lb. per hill but the α resin content fell from 10·16 to 1·8% and total soft resins from 21·8 to 9·7% as a result of GA treatment.—Carlton and United Breweries, Melbourne.

2515. Clendinnen, F. W. J.
Hop quality assessment from tasting tests.
Proc. 4th Conv. Aust. Sect. Inst. Brewing, 1957, pp. 26-31, from abstr. in *Wallerstein Lab. Commun.*, 1958, **21**: 343.

Two-sample comparison tests and the ranking of up to 4 samples at a sitting were found to be more suitable than individual sample rating for hop strain evaluation.

2516. Hudson, L. E.
Hop evaluation and utilization. II. Hop utilization. III. The deterioration of hops in storage. [French, Spanish and German summaries approx. 1 p. each for both papers.]
Wallerstein Lab. Commun., 1958, **21**: 323-35, bibl. 3, and 1959, **22**: 89-101, bibl. 16.

The first paper deals with experiments on hop usage to increase *iso*humulones in the beer. The second reports that polarimetric analysis showed the loss of α-acids in hops under ordinary storage to be negligible from picking until the following March, to be 7% per month from April until the following January and thereafter negligible once more. Cold storage, however, reduced the rate of loss of α-acids in the hops to ½% per month from April to January. [For part I, see *H.A.*, 29: 1634.]—Arthur Guinness, Son and Co., Dublin.

2517. Riedl, W., and Hübner, H.
4-Desoxy-humulon, ein neuer Hopfenbitterstoff. **(4-Desoxy-humulone, a new hop bitter substance.)**
Angew. Chemie, 1958, **70**: 343, from abstr. in *Wallerstein Lab. Commun.*, 1958, **21**: 340.

Synthesized and isolated from hops; very air- and temperature-sensitive.

2518. Verzele, M.
Posthumulone, a new "alpha acid".
Bull. Soc. chim. Belg., 1958, **67**: 278-9, from abstr. in *Wallerstein Lab. Commun.*, 1958, **21**: 339-40.

Present as 1–3% of the α-acid content of hops and differing from humulone only in the acyl chain.

Insecticidal plants.

(*See also* 2131, 2798.)

2519. Moore, R. H.
Some effects of gibberellic acid on the growth and root quality of *Derris eliptica*.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): x.

In sand culture studies GA reduced the total yield and quality of roots that were less than 6 mm. in diameter. When applied with a nutrient solution, GA increased the diameter, quality and yield of roots that were greater than 6 mm. GA decreased the fresh weight of both tops and roots, but increased the top : root ratio.—Univ. Neb., Lincoln.

2520. Joint Committee of the Pharmaceutical Society and the Society for Analytical Chemistry.
The determination of rotenone in rotenone-bearing plants with special reference to lonchocarpus.
Analyst, 1959, **84**: 735-42, bibl. 16.

2521. Richmond, D. V., and Martin, J. T.
Determination of rotenone in lonchocarpus root and oleo-resin.
J. Sci. Food Agric., 1959, **10**: 404-8, bibl. 16.

See also *H.A.*, 30: 943.

2522. Irvine, J. E., and Freyre, R. H.
Reversal of genetic dwarfism in *Tephrosia vogelii* by gibberellin.
Nature, 1960, **185**: 115, bibl. 2, illus.

In a breeding programme to develop plants of *Tephrosia vogelii* with a higher rotenone content, dwarf F_2 segregants responded to 100 p.p.m. of the potassium salt of GA as an aqueous spray by assuming normal growth, provided treatment was continued at weekly intervals. An application of IAA had no effect.—U.S. Dep. Agric., Mayaguez, P.R.

2523. Irvine, J. E., and Freyre, R. H.
Varietal differences in the rotenoid content of *Tephrosia vogelii*.
Agron. J., 1959, **51**: 664-5, bibl. 6.

Assays for leaf rotenoid content in 16 introductions varied from 0·0–2·9% dry weight. Significant differences were also found in plant height and width, leaflet number and size, and flower colour. No such differences were observed in leaf N content. A negative correlation was found between rotenoid content and plant height. [See also *H.A.*, 29: 2694.]—Federal Exp. Stat., Mayaguez, P.R.

Rubber plants.

(*See also* 2798.)

2524. Čugunov, I. E.
Concerning the frost resistance of *Eucommia*. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 19-21.

Eucommia ulmoides grew successfully in the Rostov region of Russia, provided exposed sites were avoided and the bushes were planted in or near to river valleys. In 4–5-year-old plantations carrying 600–700 bushes per hectare, 4 tons of leaves yielding 100–120 kg. of gutta were obtained per hectare.

2525. Golikov, A. I.
Growth and decline of *Eucommia* seedlings in drought conditions. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 21-5.

The highest death rate during drought occurred when *Eucommia* plants were left unmulched and were widely spaced. Sun scorch of the root neck and a dry southerly wind were the primary causes of decline during drought.

2526. Hunter, A. S., Burtch, L. M., and McDowell, C. H.
Clipping as a method of harvesting guayule for rubber.
Prod. Res. Rep. U.S. Dep. Agric. **24**, 1959, pp. 18, bibl. 6.

Plants were clipped about 2 in. above the crowns either by hand or by machine; by clipping 5- to 7-year-old plants 68–75% of the available rubber was obtained. Yields from clipping after 5 or 6 years in the field plus digging up completely 1, 2, 3 or 4 years later were greater than yields from unclipped plants of the same age. Two short-term crops also yielded less than a single crop left for the same total period. Time of clipping was important, good survival following clipping of non-irrigated guayule during the dormant season in Dec.–Mar. Plants clipped during the growing season survived poorly. Non-irrigated plants survived clipping better than irrigated plants, and a relatively high survival rate was associated with spacings closer than 28 × 20 in. Fertilizer treatment did not affect survival, and the effect of variety was only slight.

2527. Dorado Bernal, E.
Caucho de *Parthenium argentatum* G. (guayule). I. Resinoso. II. Desresinado. **(Rubber from *Parthenium argentatum* (guayule). I. Resinous. II. Resin-free.)**
Farmacognosia, 1959, **19**: 39-57, and 69-84, bibl. 6.

Processes and products of vulcanization are compared with those of hevea rubber.

2528. Shilov, E. A.
The use of carbon-14 for investigating the mechanism of biosynthesis of rubber and its concomitants in kok-saghyz.
Proc. 1st (*UNESCO*) *int. Conf. sci. Res.*, 1958, **4**: 523-34, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 2,587.

Compounds containing radioactive carbon were applied to the leaves or taken up by the roots in solution. From 60 to 80% was eliminated as CO_2, 3 to 10% was incorporated into water-soluble compounds and about 1% as cellulose, carotene, resins and rubber. The biosynthetic pathways are described, and it was concluded that the principal mechanism of rubber and carotene formation includes similar stages of condensation of molecules containing a CH_2-C group with trioses or their derivatives, but the 2 carbon components in rubber and carotene biosynthesis are not identical. β-Methylcrotonic acid was definitely excluded from the possible biosynthesis participants of both isoprene derivatives.—Ukrainian Acad. Sci., Kiev.

Seed oils.

(*See also* 1534, 2925, 3058, 3059, 3074.)

2529. Rao, B. Y.
Literature review on oils and fats, 1957.
[*Publ.*] *C.S.I.R., New Delhi*, 1958, pp. 88, bibls.

Well documented reviews on all aspects of production and manufacture.

2530. Plessers, A. G., and McGregor, W. G.
In search of new oil-producing crops.
Agric. Inst. Rev., 1959, **14**(4): 22-4, 59, illus.

Oil yield and growth potential under Canadian conditions examined in introduced species of 14 genera.

2531. Carrante, V.
Miglioramento delle sementi di piante oleaginose. **(Selection of oil-plant seeds.)**
Sementi elette, 1959, **5**(4): 18-28, bibl. 11.

Extension of oil-seed production in Italy strongly advocated; crops discussed include castor beans and grape seeds.

2532. Rao, G. V. S.
Oil from the seeds of *Acacia decurrens* Willd.
Curr. Sci., 1959, **28**: 410.

The properties of a drying oil comprising 9·41% of the seed.

2533. Aiyadurai, S. G.
A note on the germination of neem seeds (*Azadirachta indica* A. Juss.).
Madras agric. J., 1959, **46**: 127-30, bibl. 4.

Increasing atmospheric humidity delayed loss of viability of *Azadirachta indica* seeds in storage. Elongated seeds retained their viability longer than round ones. Storage at 0° C. killed the embryos.

2534. Asana, R. D., and others.
A comparative study of a diploid and an induced tetraploid of *Brassica campestris* var. *toria*. I. Observations on morphological characters related to yield.
Indian J. Plant Physiol., 1959, **2**: 9-20, bibl. 11.

The diploid had a greater number of secondary and tertiary branches and consequently a larger number of fruits than the autotetraploid. The latter, although it had fewer seeds per fruit, produced a greater weight of seeds per fruit owing to its larger seeds.—Indian agric. Res. Inst., New Delhi.

2535. Rivoira, G.
Esperienze sulla coltivazione del ricino in Sardegna (Nota II). **(Trial cultivation of castor beans in Sardinia. Note II.)**
Stud. sassar., Sez. III, 1958, 1959, **6**: 289-312, bibl. 5, illus.

All the varieties tested proved unsuitable for dry, fast-draining soil. On moderately deep sandy clays, however, Conner, Cimarron hybrid and Cimarron (U.S.A.) without irrigation gave seed yields of 10·21–11·8 q./ha. (1 q. = 100 kg.). On clay-loam soils and with 2 irrigations Cimarron (U.S.A.), Conner and Baker 195 hybrid produced 17·72–18·0 q./ha. of marketable beans. The cost of production was high. [For previous work see *H.A.*, 29: 3837.]

2536. Culp, T. W., and Stone, W. J.
Castorbeans not recommended until disease resistance is developed.
Miss. Fm Res., 1959, **22**(6): 7.

In dry years in Mississippi yields of 3,500 lb. per acre may be obtained, but in wet years, owing to *Alternaria* capsule mould, yields may be only 450 lb. Baker 296 has shown disease resistance but is not suited to the area.

2537. Ferrão, J. E. M.
Contribuição para o estudo de rícinos de Cabo Verde. **(A contribution to the study of castor beans on Cape Verde.)**
Agros, 1959, **42**: 419-35, bibl. 19.

The samples of seeds examined had high oil contents and would therefore be of good commercial value. The average N content was low, but the P content was particularly high. Neither the mineral content nor the seed size showed any correlation with the oil content. Analytical figures are given in detail.

2538. Garton, J. E., and Barefoot, A. D.
Irrigation experiments at Altus and El Reno, Oklahoma. Progress report, 1954-1958.
Bull. Okla. St. Univ. **B-534**, 1959, pp. 19.

In an irrigation rate experiment castor beans produced the highest yields when most water, 18·5 in., was applied, but the lowest rate, 6·5 in., gave the highest yields per acre-inch. Other experiments described relate to grain crops and cotton.

2539. Ivanov, V. K.
Effects of irrigation on the development and yield of the castor bean plant. [Russian.]
Doklady vsesojuz. Akad. seljsk Nauk, 1959, **24**(11): 19-23.

In the southern regions of the Ukrainian S.S.R. summer irrigation increased yields of castor beans 2- or 3-fold. A greater number of larger beans were produced per unit area, and the oil content also increased from 48% to 52% of the dry seed weight. The highest yields both with and without irrigation were obtained when the seed was sown at the end of April or early May, when soil temperature at a depth of 10 cm. had reached 12–14° C. Without irrigation the highest yields were obtained by leaving 2 plants in a group, spaced 70 × 70 cm., and in irrigated conditions by leaving 3 plants in a group.

2540. Lakiza, R. I.
The influence of the environment on sex expression in castor bean plants. [Russian.]
Fiziol. Rast., 1959, **6**: 488-90, bibl. 8.

Pot experiments are reported. Long-day treatment (22 hrs), compared with short-day treatment (9 hrs), when applied in particular during the early stages of growth, reduced the period between emergence and flowering, the total number of flowers and the male : female flower ratio and increased seed yields. Natural day length (14·5 hrs) had an intermediate effect in these respects and resulted in satisfactory seed yields. Ample soil moisture, 60 and 80% of field capacity compared with 40% f.c., when provided especially after the beginning of the differentiation of the apical meristem, reduced the vegetative period, increased the number of flowers without materially affecting the sex ratio and increased yields. High N (0·6 g. per kg. soil) applied before sowing, when compared with no N or the application of N at the beginning of differentiation, increased the vegetative period, the total number of flowers and the male : female flower ratio. Yields from the earlier application were 50% higher, and from the later application 30% higher, than those of the controls without N.

2541. Corberi, E.
Azione inibente di estratto di *Allium sativum* L. sullo sviluppo di tumori di *Agrobacterium tumefaciens* (Smith e Town.) in *Ricinus communis* L. **(Inhibitory action of an extract of *Allium sativum* on the development of galls produced by *Agrobacterium tumefaciens* on *Ricinus communis*.)**
Riv. Biol. Perugia, 1958, **50**(3): 247-55, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 2,734.

Extracts from plants containing antibiotic substances were used in the treatment of castor bean plants inoculated with *A. tumefaciens*. Both local treatment (brushing) and absorption *via* the roots were tried. Extracts from *Raphanus sativus* and *Tulipa gesneriana* did not appreciably reduce the number of plants showing typical crown gall. Local treatment with extracts of *A. sativum*, on the other hand, gave good results, the percentage of gall-free plants increasing to 69% compared with only 3% in inoculated but untreated plants.—Univ. Milan.

2542. Maini, N. S., and Sandhu, S. S.
Effect of some growth substances on seed set in *Eruca sativa*.
Sci. and Cult., 1959, **25**: 377-8, bibl. 3.

NAAm (α-naphthylacetamide) and 2,4,5-TP at 10, 20 and 40 p.p.m. and MH at 200, 400 and 800 p.p.m. were applied as sprays at the flower-bud stage. A 10 p.p.m. NAAm increased the number of pods set (although not significantly) and the total number of seeds formed; higher concentrations had little effect. 2,4,5-TP decreased pod set and seed formation at all concentrations. MH decreased the number of seeds formed, especially at higher concentrations.—Reg. Res. Centre Oilseeds, I.C.A.R., Patiala.

2543. Nishikawa, G., Mikami, T., and Kuroda, S.
Studies on the morphological characters and growth habits of safflower.
Proc. Crop Sci. Soc. Japan, 1957, **26**: 51-2, from *Rec. Res. Fac. Agric. Tokyo*, 1959, No. 8 (1957-1958), Abstr. 2.

The following observations are reported: There are varietal differences in bract number and the number of spines in the bract. Flowering begins at 4.00 a.m. and pollination by 6.00 a.m. Yellow flowered varieties are generally richer in oil than red. The oil content of the seed is correlated with the relative size of the hull. Fertilization may be much restricted by rainfall. Autumn-sown plants grow better than spring-sown, and those sown direct better than those transplanted.

2544. NARANG, S. A., AND SADGOPAL, —.
Indian stillingia oil and tallow.
J. Amer. Oil Chemists' Soc., 1958, **35**: 68-71, from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 7,514.

Composition of the seed oil and tallow of *Sapium sebiferum.*

Tannin plants.

(*See also* 2798.)

2545. GRIFFIN, L. E., JR., AND OTHERS.
Tanning extracts from canaigre roots.
[*Publ.*] *U.S. Dep. Agric.* **ARS-73-22,** 1959, pp. 29, bibl. 27, illus.

Studies on tannin extraction.

2546. HATHWAY, D. E., AND SEAKINS, J. W. T.
Hydroxystilbenes of *Eucalyptus wandoo.* The occurrence of hydroxystilbenes in *Eucalyptus.*
Biochem. J., 1959, **72**: 369-74, bibl. 44, and Suppl. p. 37p, bibl. 3.

In the first paper the isolation and identification of 3:5:4′-trihydroxystilbene and its 3-β-D-glucoside from the ether-extract of the heartwood of *E. wandoo* are described. In the second the significance of the 2 compounds for the taxonomy of the genus is discussed.—Brit. Leather Manuf. Res. Ass., Egham.

2547. HATHWAY, D. E.
Myrobalans: an important tanning material.
Trop. Sci., 1959, **1**: 85-106, bibl. 68, illus.

Myrobalans are the dried fruit of *Terminalia chebula.* Other species of *Terminalia* are also used but have much lower tannin contents. The habit, ecology and life cycle of the tree are described. It occurs throughout India, the crop mostly being exported from Madras and Bombay. The fruit is collected by shaking from the tree before or at the climacteric between October and March; January is said to be the best month. It is then sun-dried for 10 to 20 days until the pericarp becomes ribbed and very hard. As the kernel constitutes 20–50% of the fruit and contains only 2–4% of tannin, myrobalans are often crushed and the kernels removed before export. Crushed myrobalans contain 40–45% of tannin. The major part of the article is devoted to the chemistry and commercial extraction of the tannin. [See also *H.A.*, 29: 679e.]

Sundry plants.

(*See also* 1507, 1538, 2038, 2798.)

2548. PERDUE, R. E., JR.
***Arundo donax*—source of musical reeds and industrial cellulose.**
Econ. Bot., 1958, **12**: 368-404, bibl. 43, illus.

Among the aspects covered in this review are the botany of *Arundo donax*, the history of its use from ancient times in the making of woodwind instruments, its cultivation in France and other countries, methods of preparing musical reeds, and its utilization as a source of industrial cellulose, including details of its fibre structure and the chemical composition of its culms.—U.S. Dep. Agric., Beltsville, Md.

2549. SIMÃO, S.
Conservação do bambu. (**Preservation of bamboo.**)
An. Esc. sup. Agric. Queiroz, 1957/1958, **14/15**: 151-60, bibl. 8.

The phase of the moon at the time of cutting had no effect on the resistance of bamboo canes, treated with preservative or untreated, to insect pests.

2550. KRISHNASWAMI, S., PURKAYASTHA, B. K., AND CHAUHAN, N. S.
***Moghania macrophylla* (Willd), O. Ktze. (syn. *Flemingia congesta* Roxb. var. *semialata* Bak.) as a new lac host for growing the *Kusmi* strain of the lac insect.**
Curr. Sci., 1959, **28**: 419-20, bibl. 3.

2551. SINGH, S. N.
Studies in the sex-expression and sex-ratio in *Luffa* species.
Indian J. Hort., 1958, **15**: 66-71, bibl. 10.

Studies of sex-expression and sex-ratio showed that 4 types of sex form exist in *Luffa acutangula*, viz. monoecious, andromonoecious, hermaphrodite and gynoecious, whereas only monoecious flowers are produced by *L. cylindrica* and interspecific hybrids. Numbers of staminate flowers always exceeded those of pistillate flowers and reached a peak during the rains.—Hort. Res. Inst., Saharanpur, U.P.

2552. SATYANARAYANA, G., AND RANGASWAMI, G.
The effect of plant regulators on sex expression in ribbed gourd (*Luffa acutangula* Roxbg.)
Curr. Sci., 1959, **28**: 376-7, bibl. 4, illus.

The plants were sprayed at regular intervals from the seedling stage with 2 levels, 0·05 and 25 p.p.m., of 3 growth substances. In all cases flowering was delayed, total number of flowers reduced, the proportion of female flowers increased and total fruit set increased, especially by the higher dosage. These effects were consistently more marked with 2,4-D than with NAA, and with *p*-chlorophenoxyacetic acid (CIPA) than with 2,4-D. With the higher level of CIPA, the time from appearance to flowering was more than doubled, flower number reduced by 80%, the number of female flowers increased more than 3-fold, and fruit set was increased by over 50%.—Annamalai Univ., Madras.

2553. PAULA, R. D. DE G.
Alkaloids of maté.
Bol. do Int., 1956, 7(15): 3-7, bibl. 10, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-46.

Leaves up to 2 years' old contained 1·6–2·2% of caffeine, and older leaves 0·68%. Theobromine was present at 0·3% and choline in an undetermined quantity. Trigonelline was doubtful and theophylline unconfirmed.

FLORICULTURE.

General.

(*See also* 1492, 1495-1497, 1509, 1517, 1534, 3030, 3049, 3050, 3060, 3062.)

2554. BIJL VAN DUYVENBODE, J.
Report to the Government of Israel on the improvement of bulb and flower production.
Rep. FAO/ETAP **808**, Rome, 1958, pp. 10.

The report covers the present situation and problems of 9 flower crops, with recommendations on new species to be tried, nematode control, planning and marketing.

2555. THE GROWER.
Outdoor flower supplement.
Grower, 1960, Vol. **53**, No. 6, Suppl., pp. 16, illus.

This supplement contains 7 short articles by various specialists on packing, choice of crop, and commercial production of early and spray chrysanthemums, bulb flowers, sweet peas and dahlias.

2556. FJÄDERHANE, A. M., AND ARVIDSSON, L.
Arbetsstudier i trädgårdsodlingen. (**Time and motion studies in horticulture.**)
Medd. Alnarpsinst. trädgårdsekon. Byrån **29**, 1959, pp. 35 + 4 plates.

The latest time and motion studies carried out by the Bureau of Horticultural Economics, Alnarp, provide economic data on the potting of several flower crops, various operations inherent in the culture of chrysanthemums, picking and pruning tomatoes, tying pears and apples, picking strawberries and a variety of operations concerned with the propagation and cultivation of ornamentals. [For earlier studies see *H.A.*, 30: 972.]

2557. SLATE, G. L., FRESE, P. F., AND OTHERS.
A handbook on breeding ornamental plants.
Plants and Gdns, 1959, Vol. **15**, No. 2, pp. 113, illus., $1.00.

Suggestions for amateurs, principles explained, and notes on techniques and possibilities with many ornamental plants.

2558. VEREŠČAGINA, I. V.
Overwintering perennial flowers in the conditions of the Altaj region. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 34, pp. 54-6.

A 10-year study was made to determine the likelihood of different perennial flowering plants overwintering in the Altaj region, where, during severe winters, the surface soil temperature falls below —30° C. and the soil temperature at depths of 5 and 15 cm. to —14·4° and —7·2° C., respectively. Out of 140 plants tested 96, including peonies, phlox, irises, tulips, aquilegias, lilies, pinks and campanulas, successfully survived the winter without protective covers in sheltered positions in valleys, but only 38 species survived in open steppe districts.

2559. MAMELI CALVINO, E.
Gli elementi micronutritivi nella nutrizione delle piante da fiore. (**Micronutrient elements in the nutrition of ornamental plants.**)
Riv. Ortoflorofruttic. ital., 1959, **43**: 386-99, bibl. 49.

A review, covering B, Li, Mo, Co, Mn, Zn, Cu and Mg, and briefly mentioning Ba, Be, Na, Ti, V and Zr.

2560. VALENZA, F.
Recenti progressi nella difesa antiparassitaria delle colture floricole. (**Recent advances in the control of floricultural pests and diseases.**)
Not. Mal. Piante, 1959, No. 49/50, pp. 55-62.

A general discussion with reference particularly to carnations, roses and gladioli.

2561. CIFERRI, R.
Elenco preliminare delle virosi delle piante da fiore presenti in Italia. (**Preliminary list of viruses on ornamentals in Italy.**) [English summary 4 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 3-7.

Some 60 viruses are noted on about 40 types of plant.

2562. KLOMPARENS, W.
Antibiotics for tree, shrub and turf control.
Parks, 1959, **25**: 84, 86.

Fungus diseases of turf and of herbaceous and woody plants cured in the U.S.A. by Acti-dione.

2563. ANON.
Disease control chart.
Ohio Flor. Ass. Bull., 1959, No. 356, reprinted in *Ill. St. Flor. Ass. Bull.*, 1959, No. 196, pp. 12-13.

Concise presentation of flower crop disease control measures, plus notes on individual fungicides, fumigants, nematicides, weed killers and spreaders.

2564. Kuitert, L. C.
Insect pests of ornamental plants.
Bull. Fla agric. Exp. Stats **595**, 1958, pp. 51, bibl. 6, illus.

Descriptions and control measures, insecticides and equipment.

2565. Hamilton, C. C.
Use of systemic insecticides to control nursery insects.
Flor. Exch., 1959, **133** (11): 14, 20-5.

Tests with Systox, Sytam and Thimet on a range of ornamental plants showed that systemic insecticides could be used effectively against most spider mites, plant lice, mealybugs and leaf mining insects, and also against some plant bugs and leafhoppers. —Rutgers Univ.

2566. Bestagno, G., and Serini, G.
Disinfestazione di fiori recisi di garofani, rose e margherite in atmosfere artificiali a pressione normale. **(Disinfestation of cut carnations, roses, and marguerite daisies in artificial atmospheres at normal pressure.)** [English summary 14 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 126-36, bibl. 10, illus.

Tests have been successfully carried out in the Phytopathological Observatory at Sanremo on the treatment of flowers to free them from infestation by *Tortrix pronubana* and *Quadraspidiotus perniciosus*. The cut flowers, carnations, roses and marguerite daisies (*Chrysanthemum frutescens*), packed in parcels and baskets, were treated in storage rooms of 10 cu.m. in artificial atmospheres at normal pressure by the so-called "Gasconserv" method at a temperature of 18–19° C. The technique was (a) to expose them for 45 min. to a protective artificial atmosphere of CO_2 4%, N 75%, O_2 21%, (b) submit them for 120 min. to methyl bromide at 40 g./cu. m., and (c) expose them for 120–150 min. to a further, but this time reviving, artificial atmosphere, viz. O_2 79%, N_2 21%. The treatment had no ill effects on the quality of the flowers. [For earlier work see *H.A.*, 28: 677.]

2567. Peters, C. W.
Marketing Hawaiian floral products in Canada.
Hawaii Fm Sci., 1959, **8**(1): 2-4, illus.

Results of a survey in British Columbia.

Annual and herbaceous plants.

(*See also* 1536, 1549, 1557, 1560, 1562, 1564, 2555, 2556, 2560, 2562, 2566, 3029, 3036, 3041, 3076.)

2568. Palamarčuk, G. L.
Photoperiodic reaction of flowers at different stages of development. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 34, pp. 47-54, bibl. 4.

Annuals react differently to short days at different stages of growth. For example, short days delay flowering and extend the vegetative period in aster seedlings but hasten the development and ripening of the seeds. The plant's reaction is also closely related to meteorological conditions. It was established that the aster variety Ostrich and the snapdragon Rembrandt are long-day plants, whereas zinnias and salvias (*S. splendens*) are short-day plants.

2569. Fountain, C. A.
Effects of various plant regulators on the growth and development of selected herbaceous ornamentals.
Diss. Abstr., 1959, **20**: 1118-19, being *L.C. Card No. Mic.* 59-2635 of 133 pp.

Foliar sprays of MH, TIBA or IAA applied to candytuft seedlings had no effect on the number of days from germination to flowering. With snapdragons the application of these growth substances in the spring reduced the number of days to flowering, but autumn applications had no significant effect on time of flowering. Vernalized seedlings (±40° F. for 2 or 3 weeks) flowered sooner than non-vernalized seedlings, but plant weights were significantly reduced by vernalization. Growth-substance treatment further accelerated flowering in vernalized seedlings. All concentrations tested of sodium trichlorobenzoate, 2,3,5-tribromobenzoic acid, 5-chlorosalicylic acid and TIBA delayed flowering in phlox and wallflower. Single and repeated applications of TIBA to progressively older phlox plants resulted in a delay in flowering and a reduction in weight. A positive interaction between photoperiod and TIBA on the flowering of phlox occurred when plants were grown in an 8-hour photoperiod, but flowering was delayed when TIBA was applied to plants grown in other photoperiods. A decrease in the carbohydrate content of flowering plants was noted under the 8-hour photoperiod.—Mich. St. Univ.

2570. Bali, P. N., and Tandon, S. L.
Meiosis in *Alyssum maritimum*.
Indian J. Hort., 1958, **15**: 22-5, bibl. 5, illus.

2571. Vladimirskaja, M. E.
Grey mould of Chinese asters. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 101-3.

Grey mould, caused by *Botrytis cinerea*, which may appear 3–4 days after sowing, or 10–12 days after pricking out the seedlings, spreads rapidly during cool and humid weather. The disease can be reduced by using light well-drained soil, thorough removal of residues and weeds, drying the seeds at 18–20° C., eliminating small and light seeds, and by treating the sowing medium with NIUIF-2 at 1 g. per l. water. KP fertilizers increase resistance to the disease.

2572. Pontis, R. E., and Feldman, J. M.
La podredumbre del cuello y las raíces de *Callistephus chinensis* en la Argentina causada por *Phytophthora cryptogea.* **(Collar and root rot of *Calistephus chinensis* in Argentina, caused by *Phytophthora cryptogea.*).** [English summary 5 lines.]
Rev. argent. Agron., 1959, **26**: 17-22, bibl. 12, illus.

This is the first report of the disease from Argentina. At present the only control measures recommended are strict limitation of irrigation and avoiding planting china asters in the vicinity of alternative hosts such as poplars.

2573. Bacon, J. S. D.
Carbohydrates of the rampion, *Campanula rapunculus* L.
Nature, 1959, **184**: 1957, bibl. 10.

A series of non-reducing oligosaccharides was found in extracts of the fleshy roots, which by paper chromatography were indistinguishable from those of composites. This suggests a close evolutionary connexion between the 2 families.—Macaulay Inst. Soil Res., Craigiebuckler, Aberdeen.

2574. Bali, P. N., and Tandon, S. L.
Morphological and anatomical studies of a variegated chimaera in *Iberis amara* L.
Indian J. Hort., 1957, **14**: 169-71, bibl. 5, illus., [received 1959].

Changes in leaf characters were most marked.

2575. Tandon, S. L., and Bali, P. N.
Anatomical studies in diploids and autotetraploids of *Iberis amara* and *Linaria maroccana.*
Indian J. Hort., 1957, **14**: 230-2, bibl. 7, [received 1959].

See also *H.A.*, 30: 986.

2576. Steffen, L.
Der Arbeitsaufwand bei Nelken. **(Labour requirements for carnation growing.)**
Gartenwelt, 1959, **59**: 344.

Figures given in *Vakblad voor de Bloemisterij*, 1959, No. 21, on labour requirements for carnations in Italy (Pescia) and at Alsmeer are compared with some German figures. Labour requirements for 1,000 sq. m. were 385 work days in Italy, 342 work days in Holland, and about 400 in Germany. Costs in Italy were equivalent to about 2.20 German marks [about 3s. 8d.] per sq. m., and in Holland to about 6.05 German marks [about 10s.] per sq. m. In all 3 countries time spent on disbudding and cutting was about 50% of the total.

2577. Schaffer, H. G.
Mercury vapour lamps aid carnation production at Lancs nursery.
Comm. Gr, 1959, No. 3337, p. 1111, illus.

Mercury vapour lamps giving 16–17 hours light per day during the winter months until April, promoted flower production in February, March and April. Flowers from lighted plants had sturdier stems than those from unlighted plants.

2578. Bestagno, G., Bestagno Biga, M. L., and Ciferri, R.
Osservazioni preliminari su virosi del garofano. **(Preliminary observations on carnation viruses.)**
Atti Ist. bot. Univ. Pavia Ser. 5, 1959, **16**: 242-52, bibl. 8, illus.

Symptoms are described and illustrated. Control measures at present are only indirect, comprising destruction of plants after 1 year, strict selection of healthy material for propagation and the control of insect pests as potential vectors.

2579. Cuscianna, N.
Deperimenti e morie nelle coltivazioni di garofani. **(Decline and infectious diseases in carnation crops.)**
Progr. agric., 1959, **5**: 1272-3, illus.

A brief review of the main fungus diseases and of preventive and curative measures, including the use of TMTD.

2580. Bestagno, G.
La disinfezione con Vapam del suolo destinato a garofaneto. **(Disinfection of carnation soil with Vapam.)**
Not. Mal. Piante, 1959, No. 49/50, pp. 188-93, bibl. 1, illus.

Success attended attempts made to free old carnation soil badly infected with *Fusarium*, *Verticillium*, *Alternaria* and *Pleospora* by the use of Vapam at 500 kg./ha. Disease incidence was reduced from 68% to less than 1%, and the market value of the flowers was improved. Similar results followed the use of Vapam at 1,000 kg./ha.—Osserv. Mal. Piante, Sanremo.

2581. Andreucci, E.
Indagini su una grave alterazione del garofano prodotta da *Fusarium roseum* (Lk.) Snyder et Hansen. **(Investigations on a serious disease of carnations caused by *Fusarium roseum.*)** [English summary $\frac{1}{4}$ p.]
Nuovo G. bot. ital., 1958, **65**: 163-95, bibl. 83, illus.

The symptoms are longitudinal cracks at the bases of the shoots and grooves in the flowering stems, which develop short and often twisted internodes. The susceptible varieties are listed. Control measures include the avoidance of deep planting and of injury during cultivation, and treatments at 12–15-day intervals in spring and summer with either 1·5% bordeaux mixture or 0·3% zineb.—Ist. tec. agrar. Stat., Pescia.

2582. SHER, S. A.
A disease of carnations caused by the nematode *Criconemoides xenoplax.*
Phytopathology, 1959, **49**: 761-3, bibl. 11, illus.

Criconemoides xenoplax can cause a disease of carnations characterized by a reduced root system, stunted top growth, and reduction in number of blooms. The disease was eliminated by growing plants in fumigated soil. The name ring nematode decline of carnations is proposed for this disease. [From author's summary.]—Univ. Calif., Riverside.

2583. JAIN, H. K., AND MAJUMDER, P. K.
Some cytological and phenotypic effects of X-irradiation in annual chrysanthemum.
Indian J. Hort., 1957, **14**: 131-40, bibl. 16, illus., [received 1959].

A double form of the annual chrysanthemum (*C. carinatum*) was produced by X-irradiation of the dry seeds.

2584. SEARLE, S. A.
Year-round chrysanthemums.
Agriculture, Lond., 1959, **66**: 186-90, illus.

Advantages, planning, methods and economics are discussed. For day length control in 4-ft. beds a single line of 100-watt lamps, 6 ft. apart and 4½ ft. above the bed is suggested. Details of lighting periods and means of achieving them are given. Temperature control has to be superimposed on day length. A heating system capable of maintaining a winter night temperature of 60° F. is necessary. The cost, including cable, lamp holders, lamps and darkening material for a 100-ft. length of 4 ft. bed is £7 and upwards. Approximately one-third of the units will be under lights in winter. [See also *H.A.*, 28: 976.]

2585. (SHERWOOD, C. H.)
Iowa station cooperates in flower-grading study.
Ia Fm Sci., 1959, **14**: 361.

Preliminary work with Easter lilies has indicated that bulb weight is better than circumference for predicting forcing potential. Studies with chrysanthemums have shown many varietal differences in plant production from cuttings. More consistent flower production was obtained from unpinched plants than from pinched ones. Unpinched plants remained saleable for a longer period, but they took a few days longer to reach saleable condition.

2586. STUART, N. W., AND CATHEY, H. M.
Growth and metabolism of chrysanthemum as modified by nutrients and gibberellin.
From abstr. in *Plant Physiol.*, 1959, **34** (Suppl.): xvi.

Plants of 4 chrysanthemum varieties were grown by sub-irrigation nutriculture with various nutrient combinations. Gibberellin [GA] totalling 30, 150 and 750 µg. per plant was applied to the apical meristems at the time of maximum sensitivity, during the third week of short photoperiods. In a representative test plants from 4 nutrient combinations sampled 15 days after treatment had produced stems longer by 38, 83, and 142%, respectively, than those without GA. Sub-optimal amounts of nutrient N limited the amount of stem growth but increased the percentage of stem elongation of GA-treated plants. Total dry weights of the stems of these plants were 41, 63, and 90% greater than those of the controls. Leaves produced on GA-treated stems had the same dry weight as those on control plants. Combined weights of all leaves and stems were greater on the GA-treated plants by 6, 10, and 12%, respectively. These differences were maintained in similar plants sampled at early flowering, 36 days after treatment. Percentages of total ash and total N were highest in the stems of control plants, but the total amounts per stem progressively increased with increasing concentration of applied GA. An apparently greater efficiency of carbon accumulation in GA-treated plants may be due to better spacing of leaves for more light absorption or to greater phytosynthetic activity of the considerably elongated stems. [See also *H.A.*, 28: 2876.]—U.S.D.A., Beltsville, Md.

2587. BERGANN, F., AND BERGANN, L.
Über experimentell ausgelöste vegetative Spaltungen und Umlagerungen an chimärischen Klonen, zugleich als Beispiele erfolgreicher Staudenauslese. I. *Pelargonium zonale* Ait. Madame Salleron. **(On the experimentally induced vegetative segregation and the rearrangement of chimaera clones serving as an example of successful plant selection. I. *Pelargonium zonale* var. Madame Salleron.)**
Züchter, 1959, **29**: 361-74, bibl. 46, illus.

2588. EMMERSON, E.
Some investigations into the vegetative propagation of pelargoniums.
From abstr. in *Ann. appl. Biol.*, 1959, **47**: 640-1, bibl. 3.

Results using leaf-bud cuttings showed that the tip and 1st and 2nd nodes produce good plants. There was little indication that a wilted base to the cutting was a more effective barrier to fungal attack than a normal turgid base. Nutrient solution gave better results than distilled water as a rooting medium. With ivy-leaved pelargoniums maximum cutting production was obtained in winter under supplementary lighting, whereas in summer shortened days may inhibit flowering and improve cutting production. Zonal pelargoniums showed no day-length responses. Rooting was best under continuous light. In mist propagation experiments it was found that the ivy-leaved type, which has a smooth leaf, was best adapted to nist. Hairy-leaved types will probably respond etter to reduced frequency of spray application.—Vye Coll., Kent.

589. Kalyanasundaram, S.
A note on the propagation of scented geranium (*Pelargonium graveolens* Ait) in sphagnum moss.
Sci. and Cult., 1959, **25**: 378-9.

ligh rooting (82%) and subsequent survival (92%) ates were obtained when stem cuttings were ropagated in moss balls 8–10 cm. in size containing handful of soil and tied with fibre. At least nodes were buried inside the medium. The cost as less than that of using reed baskets.—Govt inchona Plantns, Naduvattam.

590. Armenise, V.
Cultura in vitro di un apice di *Pelargonium zonale* L. **(Culture *in vitro* of an apex of *Pelargonium zonale*.)**
Nuovo G. bot. ital., 1958, **65**: 377-80, bibl. 6.

n excised geranium shoot apex developed primary eristematic tissue from its tip and cambiform and arenchymatous tissue from its base.—Ist. bot., niv. Bari.

591. N.S.W. Department of Agriculture, Biological Branch.
Some diseases of geraniums.
Agric. Gaz. N.S.W., 1959, **70**: 412-17, 423, illus.

addition to the removal and burning of infected aves spraying with colloidal sulphur or zineb at oz. per 3 gal. is recommended against rust *uccinia pelargonii-zonalis*); the removal of in-cted flowers and a 2 oz. in 3 gal. spray of captan ainst grey mould (*Botrytis cinerea*); and copper ychloride, 1 oz. in 3 gal., against leaf spot (*Cerco-ora brunkii*). Soil sterilization with formalin or at treatment is the only satisfactory remedy r black leg (*Pythium* sp.), and cuttings should be pped in thiram before planting. Bacterial leaf ot and stem rot (*Xanthomonas pelargonii*) res-nd to copper oxychloride sprays, 1 oz. in 3 gal., t no satisfactory control exists for crown gall *grobacterium tumefaciens*). The virus diseases f curl and mosaic can be minimized by control the vector aphids with malathion. Diseases used by nematode infestation can be eliminated watering the soil with Systox or by soil fumiga-n with ethylene dibromide or DD.

92. Kumar, S.
Preliminary studies on colchicine induced polyploids in larkspur (*Delphinium ajacis*).
Sci. and Cult., 1959, **25**: 334, illus.

e apical growing points of 3 in. seedlings were pped in colchicine solutions. Of 4 strengths d 4 lengths of treatment used, only the 0·1% ution for 12 hours had an appreciable effect. single plant of the 10 so treated survived and showed larger and greener leaves, more and bigger chloroplasts, and increases in the size of all floral parts. The pollen mother cells showed tetraploidy.—Rajasthan Coll. Agric., Udaipur.

2593. Bennett, C. W.
Lychnis ringspot.
Phytopathology, 1959, **49**: 706-13, bibl. 6, illus.

Symptoms, host range, transmission through seed and pollen, and properties; thermal inactivation at 64°–68° C.

2594. Matveeva, T. S.
Polyploid forms of nemesia. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 43-5.

From diploid material of *Nemesia strumosa* var. *compacta* (2n=18) a tetraploid form with 36 chromosomes was obtained by means of a colchicine water solution applied to the growing points. The diploid form produced 200–250 flowers per plant and the tetraploid 150–170. The smaller number of flowers produced by the tetraploids was offset by larger flower size and more vivid colours. When diploid plants were transplanted, their flower production was reduced, but the tetraploids were not adversely affected by transplanting.

2595. Shannon, J., and Kamp, J. R.
Trials of various possible propagation methods on herbaceous peonies.
Ill. St. Flor. Ass. Bull., 1959, No. 197, pp. 4-7, illus.

Studies conducted since 1955 have shown that leaf-bud cuttings of peonies root better in June than in July. Varieties differed considerably in rooting ability, but all produced rooted cuttings within 38 days. Little improvement followed treatment with growth substances. Rooting was slightly better under an 8-hour than under a 16-hour photoperiod. The position of the bud on the stem affected the degree of rooting, there being a steady increase from the first 3-lobed leaf downwards when growth substances were used. Without growth substances, however, the rooting pattern between nodes was erratic. Serious losses in the propagating bench and after potting were caused by *Cladosporium paeoniae* and *Alternaria* sp. Fungicidal treatments have so far not given satisfactory control. Propagation from small sections of perennial underground stems is being studied, but a satisfactory technique has not yet been evolved.

2596. Vasil'evskij, A. P., and Damanskaja, L. Ju.
The effect of Thiophos on the phlox stem nematode. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 98-100, bibl. 1.

Phlox stems infested with *Ditylenchus phloxidis* showed a 5-fold decrease in the nematode population following 3 spray applications of parathion made at 10-day intervals in May–June.

2597. BÖHNERT, E., AND v. HENTIG, W.-U.
Der Einfluss der Giesswassertemperatur auf das Wachstum von Zierpflanzen. **(The effect of water temperature on the growth of ornamentals.)**
Gartenwelt, 1959, **59**: 341-2, illus.

Water which had stood in the glasshouse until it reached a temperature of 18·2° C. before watering saintpaulia plants produced less leaf injury (16·6% compared with 30%) and better flowering (148% compared with 100%) than water drawn directly from the tap.—Inst. Blumen-u. ZierpflB., Tech. Univ. Berlin.

2598. GOIDÀNICH, G., AND GARAVINI, C.
Mortalità di *Saintpaulia jonantha* per infestazione di *Meloidogyne arenaria thamesii.* **(Dying of *Saintpaulia ionantha* due to infestation by *Meloidogyne arenaria thamesii.*)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 381-5, illus.

The pest invades the roots and the stem base, gradually killing the plant by destroying parts of the vascular tissue. A few plants propagated from apparently healthy leaves in sterilized soil were affected, which suggests that the nematode may have migrated inside the petiole before the leaves were removed, or that the leaves became contaminated during removal. The majority of leaf cuttings, however, produced clean plants.—Ist. Pat. veg. Univ. Bologna.

2599. MERLO, A. S.
The characteristics of the root systems of annuals in relation to the method of raising. [Russian.]
Bjull. In-ta Biol. AN BSSR, 1956(1957), No. 2, pp. 16-23, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 73,257.

To elucidate the reason for wilting in transplanted flower crops during dry weather a study was made of the root systems of snapdragons and asters. In direct-sown plants there was a tendency to form a tap-root system with a greater depth of penetration and a higher root to shoot ratio than in transplanted seedlings. This reaction to the method of raising was more marked in snapdragons than in asters.

2600. SHUEL, R. W.
Studies of nectar secretion in excised flowers. II. The influence of certain growth regulators and enzyme inhibitors.
Canad. J. Bot., 1959, **37**: 1167-80, bibl. 24.

Low concentrations of IAA, NAA, 2,4-D and other substances usually reduced nectar secretion in *Antirrhinum majus* flowers. Two inhibitors of phosphate transfer modified the effect of IAA. [For part I, see *H.A.*, 26: 1468 l.]—Ont. agric. Coll., Guelph.

2601. WILLIAMS, W.
The control of variation in garden plants.
J. roy. hort. Soc., 1959, **84**: 317-26.

The chemical basis of the colours of anthocyanin pigments is given and genetical control of them described, with special reference to the work at John Innes on *Streptocarpus.* The origin of chimaeras and the reason for segregation in such plants is also explained.

2602. HEISER, C. B., JR., AND SMITH, D. M.
Origin of *Helianthus multiflorus.*
From abstr. in *Science*, 1959, **130**: 1418.

A hybrid between *H. annus* and *H. decapetalus.*

2603. ABBISS, H. W.
Some modern techniques of violet production.
Comm. Gr, 1960, No. 3344, pp. 281-3.

Planting, pest control and packing.

2604. STALDER, L., VOGEL, W., AND BERNET, R.
Die Penseemüdigkeit des Bodens. Untersuchung über Ursache und Bekämpfung. **(Soil sickness in pansies. Studies on causes and control.)** [English summary 24 lines.]
Reprinted from *Schweiz. GartenbBl.*, 1958, No. 1/2, pp. 3-7, illus.

Thielaviopsis basicola was found to be one of the primary causes of sickness in pansy soils. DD proved effective against the fungus, but its action was somewhat short-lived and incomplete. However, giving the plants a good start can markedly reduce losses under favourable weather and soil conditions.—Eidg. Versuchsanst., Wädenswil, and Dr. Maag AG., Dielsdorf.

Bulbs, tubers, etc.

See also 1501, 1557, 1581, 2541, 2554, 2555, 2560, 2585.)

2605. THIELKE, C.
Die Panaschüre von *Acorus.* **(Variegation in *Acorus.*)**
Planta, 1960, **54**: 210-20, bibl. 8, illus.

A periclinal chimaera shown to be the cause of variegation in *Acorus calamus* var. *variegatus* and *A. gramineus* var. *argenteostriatus.*

2606. MANN, L. K.
The *Allium* inflorescence: some species of the section *Molium.*
Amer. J. Bot., 1959, **46**: 730-9, bibl. 20, illus.

Described for *Allium neapolitanum*, *A. roseum*, *A. hirsutum*, *A. subhirsutum*, *A. zebdanense* and *A. erdelii.*

2607. MATILE, P.
Über die Lichtabhängigkeit der Blütenwärme von *Arum italicum.* **(The relationship between light and flower temperature in *Arum italicum.*)**
Ber. schweiz. bot. Ges., 1958, **68**: 295-306, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 5,427.

Twenty-four hours after stimulating male flowers with light at an early pre-floral stage the temperature of the flowers rose and scent production started. Continued illumination resulted in the generation of more heat. Artificial heating did not stimulate scent formation, although it influenced other phases of flower development.

2608. WIRTH, K.
Experimentelle Beeinflussung der Organbildung an in vitro kultivierten Blattstücken von *Begonia rex.* **(Experimental influences on the formation of organs on leaf fragments of *Begonia rex* cultured *in vitro.*)**
Planta, 1960, **54**: 265-93, bibl. 29, illus.

In particular the effect of growth substances on organ formation by begonia leaf fragments cultured aseptically on solid media.

2609. VASIL'EVSKIJ, A. P., AND KAREVA, V. M.
Powdery mildew on begonias. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, p. 100.

Oidium begoniae, causing powdery mildew of begonias in glasshouses, was effectively controlled by spraying with a copper-soap mixture (150 g. green soap + 15 g. $CuSO_4$ to 10 l. water). It may be necessary to repeat spraying after a lapse of about 3 weeks, this time adding colloidal sulphur (50 g./10 l.), to the mixture.

2610. WILSON, J. Y.
Verification of the breeding system in the bluebell *Endymion nonscriptus* (L.) Garcke.
Ann. Bot. Lond., 1959, **23**: 201-3, bibl. 5.

Careful pollination experiments showed it to be only partially self-sterile.

2611. MAATSCH, R., AND ISENSEE, H.
Keimung von Cyclamen in Substraten mit verschiedener pH-Werten. **(Germination of cyclamen seed in media of different pH values.)**
Gartenwelt, 1959, **59**: 363.

Complaints of bad germination led to triplicated experiments in which 100 seeds each were submitted for germination to media in which the pH ranged in 11 stages from 3·7 to 7·2, a constant temperature of 18° to 20° C. being maintained in the room. These experiments were started on April 2 and repeated on October 21, and results, which were practically the same on both occasions, were recorded 60 days later. Although certain slight variations in germination due to other factors occurred above a pH of 4·5, the highest percentage germination achieved was 94% at pH 7·2, and the necessity of a non-acid medium for the germination of cyclamen seeds was clearly demonstrated.

2612. REEKER, R.
Cyclamen in Torfkultur. **(Cyclamen growing in peat.)**
Gartenwelt, 1959, **59**: 325-7, illus.

A basic dressing of 1·5 kg. of complete fertilizer per cu. m. of peat is recommended for cyclamen, with an equivalent dressing at each pricking-out. For Christmas flowering sowing should take place not later than the end of February. When the plants are potted and grown on an uncovered greenhouse bench, a complete fertilizer at 3 kg./cu. m. should be added to the potting medium. When the pots are sunk in peat with nutrient irrigation, a dressing of 1·5 kg./cu. m. at potting is adequate.

2613. PEARMAN, J. A.
Diseases of dahlias.
Agric. Gaz. N.S.W., 1959, **70**: 369-75, illus.

The spread of spotted wilt and stunt, of which the vectors are thrips and aphids respectively, can be prevented by spraying with 0·05% malathion every 10 days. Sulphur preparations are recommended for the control of powdery mildew (*Oidium* sp.) and thiram and captan for grey mould (*Botrytis cinerea*) and leaf spot (*Entyloma dahliae*). The burning of all infected plants and crop rotation are necessary to minimize attacks of stem rot (*Sclerotinia sclerotiorum* and *Sclerotium rolfsii*), crown gall (*Agrobacterium tumefaciens*) and root-knot (*Meloidogyne* sp.). The last named nematode can be destroyed, where the value of the crop warrants the expense, by soil fumigation with ethylene dibromide, methyl bromide, DD or Nemagon.

2614. OLISEVIČ, G. P.
The use of chemicals with systemic activity for the control of aphids under glass. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 91-5.

Spraying dahlias and other plants with 0·1–0·2% Mercaptophos and octamethyl [schradan] eradicates *Myzodes dianthi* and *Neomyzus circumflexus.* The spraying should be done at 15–20-day intervals. None of the compounds has an adverse effect on the plants, but the first remains toxic to aphids for more than 3 months and the second for about 2 months.

2615. MANTROVA, E. Z., AND ZDASJUK, V. I.
The manuring of gladioli. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 46-9.

Nitrogen fertilizers placed in the soil at a depth of 8–10 cm. together with P fertilizers placed at a depth of 25–30 cm. had the most favourable effect on the quality and length of life of gladiolus flowers. NK, K and NPK aided sugar synthesis, which is most intensive during flowering. [For earlier work see *H.A.*, 28: 3943.]

2616. HALEVY, A. H.
Changing the critical moisture in the various stages of gladiolus.
From abstr. in *Bull. Res. Coun. Israel, Sect. D*, 1959, **7D**: 111.

The development of the gladiolus plant is divided into 3 stages, (a) from emergence to the full extension of the fifth leaf, (b) from the fifth leaf to anthesis, and (c) from anthesis to harvest. Critical soil moisture tensions, at which irrigation is needed and on which yield depends, are quoted for each stage depending on whether the crop required is corms or flowers.

2617. Kosugi, K., Sumitomo, A., and Katagiri, T.
Studies on the propagation of gladioli for export. I. On the effects of daylength upon corm and cormel formation in gladioli. [Japanese, with English summary ½ p.]
Tech. Bull. Fac. Agric., Kagawa Univ., 1957, **9**: 59-65, bibl. 10, [received 1959].

Long-day treatment delayed maturity, resulting in later blooming and longer spikes with more florets. Corm formation showed varietal variation in response to differing photoperiods, but, in general, weight and number of cormels was greatest under 8–10 hrs of daylight in summer.

2618. N.S.W. Department of Agriculture, Biological Branch.
Treatment of gladioli corms.
Agric. Gaz. N.S.W., 1959, **70**: 301-5, illus.

Chemical dips given immediately after corms are lifted, or before replanting, give excellent control of *Sclerotinia*, *Botrytis*, *Septoria* (hard rot), and bacterial scab. Where decay has become advanced during the growing season no control is satisfactory. For post-harvest dipping corms should be lifted as soon as possible after flowering, and dipped in phenyl mercury acetate (1 part of a 2½% emulsion in 100 parts of water) for 15–30 mins. Phenyl mercury acetate can also be used as a pre-planting dip; other substances suggested include corrosive sublimate and calomel. A hot-water treatment of cormels is suggested for the control of *Fusarium* yellows.

2619. Schenk, P. K.
Warmwaterbehandeling van gladiolen. **(Hot water treatment of gladioli.)**
Weekbl. BloembollCult., 1959, **70**: 246, 251.

Mercury compounds can be used to disinfect gladiolus corms but do not give satisfactory results on the spawn (cormels). Hot-water treatment of the spawn for half an hour at 53° C. gives almost complete protection against hard rot [*Septoria gladioli*] and dry rot [*Stromatinia gladioli*]. For control of *Fusarium* rots a temperature of 55° C. is preferable, but the risk of damage to the spawn is greater. Detailed instructions are given for carrying out the hot-water treatment.—Lab. BloembollOnderz., Lisse.

2620. Procenko, E. P.
Premature yellowing of gladioli. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 30, pp. 78-84, bibl. 17, illus.

As caused by *Fusarium* infection, which is most troublesome on organic soils.

2621. Šaronov, V. A., and Filatova, E. P.
Concerning the premature yellowing of gladioli. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 30, pp. 86-90, bibl. 5, illus.

When screening corms before planting, to prevent yellowing caused by *Fusarium* spp., the authors recommend making a thorough examination of the root base. In healthy corms the rootlets appear in a regular complete circle at the base, and grow into transparent shiny roots, whereas in diseased corms the rootlets only appear here and there at the base, often only on one side, and grow into opaque roots with brown ends. When cut horizontally and vertically such corms exhibit brownish lines in their vascular tissue and spots all over the cut surface.

2622. Ceruti Scurti, J.
La fusariosi dei gladioli. Caratteri dei ceppi di *Fusarium* isolati e prove orientative di lotta. **(*Fusarium* disease of gladiolus. Characters of the *Fusaria* isolated and methods of control attempted.)** [English summary 15 lines.]
Not. Mal. Piante, 1959, No. 49/50, pp. 145-60, bibl. 31.

The characters of some strains of *Fusarium oxysporum* f. *gladioli* obtained from disease-affected corms are described. Methods of treatment used by the author before storage and before planting are given in detail, and a table is provided in which control methods advocated by other workers are set out.—Osserv. Mal. Piante, Torino.

2623. Hoogeterp, P.
Met welk middel gaat U de hyacintebollen ontsmetten? **(What material will you use for disinfecting hyacinth bulbs?)**
Weekbl. BloembollCult., 1959, **70**: 245.

Tables are given to show the effects of 8 chemicals, used as dips or dusts for control of foot rot [*Fusarium culmorum*], on the yield of hyacinth bulbs and on the amount of bacterial infection. Formalin watered on to the soil often improved the yield of dipped bulbs. The mercury compounds AAbulba, Aretan and Panosan and the newer chemicals Orthocide, Tuzet and Brassicol had as great a stimulating effect on yield as formalin. Tuzet dip and Brassicol dust also gave good protection against bacteria.—Proefst. BloembollCult., Lisse.

2624. Marshall, R.
One hyacinth now is worth two later.
Grower, 1959, **52**: 950-2, illus.

A method of forcing bulbs in sheds is described, which has been adopted in Lancashire, and which uses electricity for both light and heat. For lighting, 40-watt tungsten lamps are spaced out on a wooden frame and suspended at 12 to 18 inches above the bulbs. A heating cable is used for soil heating, and the room temperature is maintained at about 70° F. Hyacinths are forced for Christmas sale and are followed by a crop of tulips.—N.W. Electricity Bd.

2625. KARTASCHOFF, R.
Die Keimverzögerung der Samen von *Iris pseudacorus* L. **(The retardation of seed germination in *I. pseudacorus*.)**
Ber. schweiz. bot. Ges., 1958, **68**: 145-82, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 5,437.

Alternating temperatures of 22° and 30° C. increased the percentage and the rate of germination. These increases were further augmented by removing or rupturing the endosperm, but this did not affect the growth rate of the embryo itself. The germination of excised embryos was not affected by alternating temperatures but was markedly inhibited by extracts of the endosperm of ungerminated seeds. Extracts of germinating seeds did not have this inhibiting effect, nor was the inhibition caused by extracts from ungerminated seeds counteracted by alternating temperatures.—Univ. Basle.

2626. ROYAL HORTICULTURAL SOCIETY.
The lily year book 1960, No. 23. Conference number.
R.H.S., London, 1959, 9 × 5½ in., pp. 185, illus., 15s. + 1s. 3d. postage, or U.S.A. $2.25 post free.

This volume, which is considerably larger than usual, includes all the papers read at the third Lily Conference held in July, together with the discussions on them. At this Conference leading lily growers from many parts of the world presented reports on lilies in their respective countries, namely England, Scotland, Holland, Japan, Australia, New Zealand and Canada. S. L. Emsweller reviewed current research on lilies in the U.S.A.; Jan de Graaf described hybridization work at the Oregon Bulb Farms; recent developments in fritillary culture in Britain were discussed by P. Furse; and there was a general discussion on the genus *Nomocharis*. In addition to the conference report, this volume contains the Lily Group Discussion on *Eremurus*, notes on some hybrid lilies and an article by G. Barich on experiences with lilies in Eastern Germany. There are 5 pages of very handsome coloured plates.

2627. ROBERTS, A. N., AND CALVIN, L. D.
Which method is best to grade lily bulbs—size or weight?
Flor. Exch., 1959, **133**(18): 11.

From the results of a statistical study it is concluded that both size and weight are closely correlated with flower bud production and that both are reliable in predicting bud count.—Ore. St. Coll., Corvallis.

2628. KASPARJAN, A. S., AND ZAJCEVA, E. N.
Overcoming sterility in three forms of lilies. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 77-80, bibl. 3, illus.

Three valuable lily hybrids, Nos. 364, 364-4-20, and 35, were found to be sterile. The application of naphthylacetic acid or indolylacetic acid at 0·01% to the stigmata before pollination resulted in seed production in all 3 forms.

2629. ORLOV, M. I.
The life and unfolding time of lily flowers. [Russian.]
Bjull. glav. bot. Sada, 1957, No. 28, pp. 121-2, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,929.

The buds of *Lilium regale* took 50–70 hours to open, and the inner petals 2 hours. The flowers remained fresh for 5 days and wilting took 2 days.

2630. ROYAL HORTICULTURAL SOCIETY.
The daffodil and tulip year book, 1960, No. 25.
R.H.S., London, 1959, 9 × 5½ in., pp. 165, illus., 12s. 6d. + 1s. 3d. postage, or U.S.A. $2 post free.

Daffodil enthusiasts are kept well up to date with the flood of new varieties by D. A. Lloyd's survey of the best exhibition daffodils of 1959, by H. R. Barr's account of the daffodil trials at Wisley, by the reports on various shows throughout the country, and by the lists of awards and newly registered names. There are also several interesting descriptive articles on daffodils, including the miniature varieties, in the U.S.A., New Zealand and Australia. A symposium on the use of pre-emergence herbicides in daffodil and tulip crops includes contributions from J. Wood at Kirton and D. V. Peabody at Washington State University. D. W. Lefeber from Lisse describes his experience in raising and introducing new tulip varieties, particularly the magnificent Darwin hybrids, and Prof. E. van Slogteren gives a fascinating account of the history and horticultural value of broken tulips, illustrated by 14 colour plates.

2631. DENNE, M. P.
Leaf development in *Narcissus pseudonarcissus* L. I. The stem apex.
Ann. Bot. Lond., 1959, **23**: 121-9, bibl. 11, illus.

The changes in size and organization of the daffodil apex during a plastochron [the time interval between the production of two successive leaves] and during the growing season are described. No relationship between the seasonal changes in the apex and the periodical production of scale and foliage leaves could be established.—Univ. Coll., Lond.

2632. Bryant, M., and Fowden, L.
Protein composition in relation to age of daffodil leaves.
Ann. Bot. Lond., 1959, **23**: 65-74, bibl. 20.

Samples of proteins, representing over 90% of the leaf proteins, were isolated from leaf sections of varying ages. Age appeared to have no effect on the amino-acid composition of these proteins, although the free amino-acid content of the leaves tended to decrease with age. The amino-acid composition of proteins from the bulb scale leaves, however, was found to differ markedly from that of leaf proteins.—Univ. Coll., Lond.

2633. Statens Forsøgsvirksomhed i Plantekultur.
Forsøg med udbringningstid for kalksalpeter til tulipaner 1955-57. Foreløbig meddelelse. **(Experiments on the time of applying calcium nitrate to tulips, 1955-57. Preliminary communication.)**
Tidsskr. Planteavl, 1959, **63**: 525-7.

Tulips benefited most from splitting up the total amount of calcium nitrate applied (600 kg./ha.), as, for instance, when one-quarter of the total was applied on each of the following dates: 1st October, 1st November, 1st January and 1st April.

2634. Halevy, A. H., and Asen, S.
Identification of the anthocyanins in petals of tulip varieties Smiling Queen and Pride of Haarlem.
Plant Physiol., 1959, **34**: 494-9, bibl. 9.

The petal tissue of the variety Smiling Queen contained cyanidin-3-glucoside (chrysanthemin), cyanidin-3-rhamnoglucoside (antirrhinin), pelargonidin-3-glucoside (callistephin) and pelargonidin-3-rhamnoglucoside. The petals of the variety Pride of Haarlem contained the 4 anthocyanins found in the petals of the variety Smiling Queen and delphinidin-3-rhamnoglucoside. [From authors' summary.]—U.S.D.A., Beltsville, Md.

2635. Dormer, K. J., and Cutter, E. G.
On the arrangement of flowers on the rhizomes of some Nymphaeaceae.
New Phytol., 1959, **58**: 176-81, bibl. 1, illus.

Nymphaea alba and *Nuphar* species.

Lawns and sports turf.

(*See also* 2064-2069, 2562, 3041.)

2636. McVey, G. R., and Wittwer, S. H.
Responses of certain lawn grasses to gibberellin.
Quart. Bull. Mich. agric. Exp. Stat., 1959, **42**: 176-96, bibl. 19, illus.

Merion bluegrass (*Poa pratensis*) showed marked growth responses to foliar applications of gibberellin, but Japanese lawngrass (*Zoysia japonica*) responded less noticeably. Soaking bluegrass seeds in 100 or 1,000 p.p.m. solutions increased the rate and percentage of germination under sub-optimal conditions, and the density of bluegrass sown in the spring was increased by soaking the seeds for 24 hrs in a 10 or 100 p.p.m. solution. In pot trials a foliar spray of 100 p.p.m. applied 3 weeks after the emergence of bluegrass resulted in increases in growth (height and density) a week after treatment, which was equivalent to that made by the controls in 3 weeks. Autumn applications resulted in poor quality and chlorosis. Under conditions of short days (9 hours) or low temperatures (13° C.) bluegrass treated with 100 p.p.m. made growth similar to that of grass grown in long days (18 hours) or higher temperatures (18° C.). With Japanese lawngrass seed treatments were not effective, and the chlorosis induced by foliar applications was only partially alleviated by high levels of fertilizer.] [For earlier work see *H.A.*, 28: 714.]

Foliage and succulent plants.

(*See also* 2349, 3018.)

2637. Berninger, L. M., and Beck, G. E.
House plants.
Circ. Univ. Wis. Ext. Serv. **567**, 1959, pp. 25, illus.

Simple instructions on their care.

2638. Waffenschmidt, H.
Neue Wege in der Vermehrung und Kultur der Aspidistra. (**New methods of propagating and growing aspidistras.**)
Gartenwelt, 1959, **59**: 343-4, illus.

Recommended potting mixture and propagation by rhizome pieces for *Aspidistra elatior*.

2639. Salimei, S.
Le *Dieffembachia*. (**Species of *Dieffenbachia*.**)
Ital. agric., 1959, **96**: 986-9, illus.

Varieties of 6 species of this poisonous genus are described, with brief notes on their cultivation, and on that of the allied genus *Aglaonema*, as house plants.

2640. Basteleus, R.
Les *Monstera* ne sont pas des philodendrons. (***Monstera* species are not philodendrons.**)
Bull. hort. Liège, 1960, **15**: 46-9, bibl. 5, illus.

Includes descriptions of several *Monstera* spp. and their propagation and culture as ornamentals.

2641. Oltmanns, O.
Über den Einfluss der Temperatur auf die endogene Tagesrhythmik und die Blühinduktion bei der Kurztagpflanze *Kalanchoë blossfeldiana*. (**On the effect of temperature on the endogenous daily rhythm and flower induction in the short-day plant *Kalanchoe blossfeldiana*.**)
Planta, 1960, **54**: 233-64, bibl. 46, illus.

The endogenous daily rhythm in the movement of *Kalanchoe* petals was observed in permanent darkness for 4–7 days at temperatures ranging from 13° to 30° C. With a 9-hour day flower induction occurred at temperatures between 15 nd 30° C. With a 12-hour day flower induction occurred at 25° C. and, to a lesser degree, at 20° nd 30° C.—PflPhysiol. Inst. Univ. Göttingen.

2642. Viana, M. J.
On the differential action of indolyl-acetic acid (IAA) and gibberellin (GA) on decapitated plants of *Bryophyllum daigremontianum* (LSDP). Substitution of apical dominance for a "basal dominance".
Portugal. Acta biol., Sér. A, 1958, **5**: 283-6, bibl. 10, illus.

When applied to the leaves IAA at 500 mg. per l. water induced rooting all along the stem and otally inhibited flowering and lateral shooting. When similarly applied GA at 50 mg. of the K salt per l. partially inhibited lateral shooting and ppeared to promote flowering but did not induce ooting.—Lisbon bot. Inst.

643. Bopp, M.
Hemmung der Induktionsvorgänge bei Wurzelhalsgallen durch 2-Thiouracil und 5-Bromuracil. **(The inhibition of the processes inducing crown gall by 2-thiouracil and 5-bromouracil.)** [English summary ⅔ p.]
Planta, 1960, **54**: 221-32, bibl. 25.

he effects of 5-bromouracil and 2-thiouracil on *grobacterium tumefaciens*, on plants of *Kalanchoe igremontiana* and on the crown galls formed on *alanchoe* were investigated. A concentration of γ/cm^3 of bromouracil did not affect the wound uction or the development of the plants. Thioacil affected the development of the lamina under me conditions. The formation of crown galls s inhibited by both bromouracil and thiouracil, e extent of the inhibition depending on the ncentration. Bromouracil was effective only hin the first 3 days after infection, whereas ouracil inhibited the growth of the tumours ring all stages of development.—Bot. Inst. iv. Freiburg i. Br.

44. Pratella, G. C.
Lo *Sclerotium rolfsii* Sacc. su radici di *Polypodium*. **(*Sclerotium rolfsii* on *Polypodium* roots.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 362-5, illus.

e fungus frequently develops on the exposed ts and rhizomes of *Polypodium* used by Italian ists to form "lucky monkeys", and spreads the leaves. So far, little success in control has n achieved with oxyquinoline sulphate, PCNB corrosive sublimate, all of which delay leafing.

Orchids.

(*See also* 3024.)

2645. Razmologov, V. P.
An embryological investigation of the orchid *Phalaenopsis schilleriana*. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 67-72, bibl. 5, illus.

P. schilleriana and some other [unspecified] orchids are characterized by a reduction of the female gametophyte in the presence of a small non-differentiated embryo and by the absence of endosperm. Thus this species belongs to the group in which the number of seeds can only be increased at the expense of their weight.

2646. Gerola, F. M., and Cazzulani, L.
Modificazioni cariologiche determinate dalla presenza di ife in protocromi di orchidacee. **(Nuclear modifications caused by the presence of hyphae in orchid protocorms.)**
R.C. Ist. lombardo, 1955, **88**: 564-76, from abstr. in *Ann. Fac. Agrar. Univ. cattol. S. Cuore*, 1958, **65**: 143.

The fungal symbiont of *Cymbidium* sp. was introduced, in its normal form and as a parasitic strain, into the sterile medium in which the orchid protocorms were grown. In the former case the host cells showed signs of intensified metabolism, enlarged nuclei, and polymerization of deoxyribonucleic acid as a result of hyphal penetration, but the parasitic form brought about depolymerization of this acid and degeneration of the nuclei.

Roses.

(*See also* 1578, 1962, 2560, 2566, 3041, 3057, 3068.)

2647. Randall, G. O., Garriss, H. R., and Scott, H. E.
Successful rose culture.
Circ. N.C. agric. Ext. Serv. **200**, revised 1959, pp. 23, illus.

Outdoor rose growing, with recommended varieties and control of diseases and pests.

2648. Rowley, G.
Some naming problems in *Rosa*.
Bull. Jard. bot. Bruxelles, 1959, **29**: 205-11, bibl. 8.

Revised nomenclature for several species and their botanical varieties.

2649. Klimenko, V. N.
Breeding garden roses at the Nikitskij botanical garden. [Russian, with English summary.]
Bjull. nauč.-tehn. Inform. Gos. Nikitsk. bot. Sad, 1957, No. 3-4, pp. 37-9, from *Ref. Ž.* (*Biol.*), 1958, No. 15, Abstr. 68,414.

An outline of the work at this garden near Yalta, which contains 1,200 named roses.

2650. UOTA, M., HARVEY, J. M., AND LATEER, R. W.
Commercial packaging and storing of bare-root rose bushes.
Mktg Res. Rep. U.S. Dep. Agric. **308**, 1959, pp. 31, bibl. 5, illus.

See *H.A.*, 29: 1733.

2651. MIHAILOV, N. L.
The effect of spacing on the size and development of *Rosa canina* L. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 30, pp. 38-41, bibl. 4, illus.

When *R. canina* plants were spaced at 0·3 × 1 m. they made the best bushy development and root growth during the first 2 years of growth. Plants spaced at 0·5 × 1 m. and more also grew rapidly but with few and thicker roots, while plants spaced at 0·2 × 1 m. or less showed signs of crowding. The 0·3 × 1 m. spacing proved very successful in growing standard roses.

2652. HOLLEY, W. D.
Continual pruning of roses.
Flor. Exch., 1959, **133**(13): 15.

In tests started in 1958 with greenhouse roses pruning throughout the year, on a basis of stem diameter, was compared with normal cutting back in May and June. It was found that for each mm. increase in diameter of the mother cane, a 10 cm. increase in flower stem length occurred; therefore, when the canes decreased in vigour to a certain minimum diameter, they were cut back to stronger wood. In addition, when the canes became too high they were cut back to a convenient working level. On good canes ($\frac{3}{16}$ in. diameter or more) flowers were cut to the second 5-leaflet eye, unless they were high on the plant in which case they were cut to the first 5-leaflet eye (October-February) or to the knuckle (March-September). On thin wood ($\frac{1}{8}$ in. in diameter) lateral flowers were cut at their juncture with the cane and terminal flowers were cut back to good wood. The breaks from thin canes which had been cut back were soft-pinched once before any flowers were cut. The numbers of flowers produced on plants pruned in this way were the same from January until mid-June as, and much greater from June until December than, those on plants pruned normally. The annual yield increase was about 30%.

2653. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Sygdomme og skadedyr på roser i haven. **(Diseases and pests of garden roses.)**
Tidsskr. Planteavl, 1959, **63**: 361-4.

And their control in Denmark.

2654. KRISTENSEN, H. R., AND THOMSEN, A.
Virussygdomme hos roser I. (**Virus diseases of roses. I.**) [English summary $\frac{3}{4}$ p.]
Tidsskr. Planteavl, 1959, **63**: 369-93, bibl. 25.

A virus disease of roses has been discovered which was later identified as yellow mosaic; this is the only rose virus known to occur in Denmark. While symptoms of the disease were hardly noticeable in *Rosa canina*, they were very marked in *R. multiflora* which makes the latter a useful indicator plant. Preliminary investigations suggest that the symptoms are suppressed by high temperatures.—Danish Institute of Plant Pathology.

2655. LJATINA, A. S.
On the resistance of roses to stem-canker disease. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 103-6.

Rose canker caused by *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*] and *C. wernsdorfiae* has been noted in all regions of the U.S.S.R. The peak period of disease development is in the spring. There were no signs of canker in the following types: *pimpinellifolia*, *centifolia* × *moschata*, *rutiginosa hybrida*, *rugosa*, and *rugosa hybrida*. The disease is very serious, spreads rapidly and appears difficult to control. Selection of resistant varieties is recommended.

2656. ROGERS, M. N.
Some effects of moisture and host plant susceptibility on the development of powdery mildew of roses, caused by *Sphaerotheca pannosa* var. *rosae*.
Mem. N.Y. St. Coll. Agric. **363**, 1959, pp. 38, bibl. 56, illus.

The effects of relative humidity levels near the leaf surface on the development of rose powdery mildew were studied in a specially constructed controlled-temperature chamber. Neither incidence nor severity of the disease were affected by R.H. values at the upper surface of the leaf ranging from 55 to 100%, until condensation occurred. Intermittent mist applied immediately after inoculation was found to inhibit all phases of mildew development, particularly spore germination. Mist applied after infection was established caused no immediate reduction in mycelial development or sporulation, but ultimately caused collapse of the conidia. The possibility that low temperature may favour mildew development is discussed. Old leaves were much less susceptible to infection than young leaves, and the upper leaf surfaces were more susceptible than the lower. Leaves produced under intermittent mist did not differ in susceptibility from leaves grown without mist. Exploratory studies on the effect of reserve carbohydrate supplies in the leaves upon susceptibility indicated a need for further investigation. The construction of the controlled-temperature chamber used in this work is described.

2657. PROCENKO, E. P.
Antibiotics for the control of powdery mildew. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 78-82, bibl. 7.

strain of *Actinomyces griseus* (formerly known Virusin 1609) was found to possess strong ibitory properties against powdery mildews of umbers (*Erysiphe cichoracearum*) and roses *haerotheca pannosa*) when sprayed at 1 : 1,000, hough slight scorching occurred. The protec- action lasted 10–14 days, but new leaves veloping on diseased plants became infected. On es the actinomycete spray was more effective n copper sulphate.

58. Mokrickaja, M. S.
Rose rust in the Leningrad region. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 96-105.

ntrol measures against rose rust, caused by *agmidium mucronatum* and *P. rosae-pimpinelli- ae* include: the use of 40–50 tons/ha. of manure ether with PK fertilizers (1 : 2) at 400–500 /ha.; wider spacing; destroying all foci of infec- 1 (commonly the wild *Rosa canina*); and early ng and autumn spraying with either 8% olineum, 2% No. 47 (VIZR), 0·5% No. 78 ZR) or 4–5% bordeaux mixture. The applica- of 100% carbolineum paste to the affected ns should be used only on bushes that are at t 1 year old. Summer spraying at 10–13-day rvals with 1% bordeaux mixture is essential. varieties found most susceptible to *P. mucro- um* were Frau Karl Druschki, Maria Figuer, l Neyron, Ulrich Brunner and Heinrich Munch. also *H.A.*, 30: 1061.]

9. Garavini, G.
La cicalina delle rose. **(The rose leaf hopper.)**
Inf. fitopat., 1959, **9**: 234-5, illus.

pest *Typhlocyba rosae* is most effectively con- ed on rose bushes, fruit trees, hazel and chest- trees by spraying with phosphoric esters or tine sulphate, particularly on the lower sur- s of the foliage.

0. Taylor, E. A., Henneberry, T. J., and Smith, F. F.
Control of resistant spider mites on greenhouse roses.
J. econ. Ent., 1959, **52**: 1026-7, bibl. 1.

5 rose varieties infested with a highly resistant n of *Tetranychus telarius* weekly applications lb. of 25% Tedion plus 2 lb. of 15% Aramite a wetter in 100 gal. of water gave the best rol and the highest number of flowers per plant. er commercial conditions Tedion plus Aramite lb. each in 100 gal. also gave good results but ed certain rose varieties.—Agric. Res. Serv., D.A.

. Jackson, G. A. D., and Barakat, S. E. Y.
The organic acids in rose hips.
Nature, 1959, **184**: 1953-4, bibl. 8.

development of organic acids was studied, by ling at 6 stages from bud to over-ripe fruit, in *R. arvensis*, *R. canina*, *R. rubiginosa*, *R. sherardi* and *R. rugosa*. Results are given for *R. canina*. In early stages when cell division was active malic and quinic were the main acids, citric becoming the principal acid at maturity. Small quantities of succinic acid were also present. These changes and the synthesis of citric acid are discussed.—Univ. Coll. N. Wales, Bangor, and Univ. Alexandria.

Other trees and shrubs.

(*See also* 1507, 1556, 1557, 1578, 1633, 1912, 1922, 1962, 2500, 2562, 3032, 3050.)

2662. Snyder, L. C.
Hedges for Minnesota gardens.
Minn. Hort., 1959, **87**: 100-1, illus.

Shrubs suitable for informal and clipped hedges are listed, with spacing and dimensions.

2663. Bubrjak, I. I.
The effect of the density of stand of subtropical plants on their winter hardiness. [Russian.]
Dokl. i Soobšč. Užgorodsk. Un-t, 1957, No. 1, pp. 19-20, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 73,177.

In Transcarpathia the advantage of group spacing over single spacing was established for tea [see also *H.A.*, 28: 943], Japanese privet, Spanish gorse, Arizona cypress and laurel.

2664. Smith, A. G., Jr.
Pruning ornamental plants.
Circ. Va poly. Inst. agric. Ext. Serv. **834**, 1959, pp. 4.

Practical advice on what, when and how to prune.

2665. Nichols, L. P.
Tree diseases, description and control.
Spec. Circ. Pa agric. Ext. Serv. **46**, 1959, pp. 19, illus.

On 38 ornamental trees.

2666. Statens Forsøgsvirksomhed i Plantekultur.
Jordbehandling til planteskolekulturer. **(Soil treatment in plant nurseries.)**
Tidsskr. Planteavl, 1959, **63**: 355-6.

Brief notes are given on experiments carried out in 1954–57 on the sterilization of nursery soil by chemicals and steam. Among chemicals tested, the following proved to be the most suitable: D-D, chloropicrin and methyl bromide, all at 50 g./sq. m., and formalin at ½ litre/sq. m. Steam sterilization yielded the most consistently good results, the promotion of growth due to the treatment being most pronounced in apple seedlings. The growth promoting action of chloropicrin was even greater than that of steam, but the effect of the other chemicals on growth was less marked. *Picea abies*, *Pinus nigra austriaca*, *Rosa canina*, *Malus silvestris* and *Betula verrucosa* seedlings were the test plants.

2667. SCHREAD, J. C.
Thimet soil treatments for control of leaf miners, galls, and lace bugs.
J. econ. Ent., 1959, **52**: 712-13, bibl. 1.

Thimet 2% granules applied at several rates to the soil around trees or shrubs in 1957 gave season-long control of the birch leaf miner (*Fenusa pusilla*), the holly leaf miner (*Phytomyza ilicis*) and the boxwood leaf miner (*Monarthropalpus buxi*) [see also *H.A.*, 28: 3975], and the higher rates used in each experiment continued to control the leaf miners in 1958. Soil applications of Thimet 2% granules or 48% emulsions gave good control of the first brood of honey locust pod gall maker (*Dasyneura gleditschiae*) but were ineffective against later broods. Thimet 8% granules applied to the soil and watered in controlled the andromeda lace bug (*Stephanitis globulifera*) and the azalea lace bug (*S. pyrioides*).—Conn. agric. Exp. Stat., New Haven.

2668. ALLEN, H. W.
The Japanese weevil *Pseudocneorhinus bifasciatus* Roelofs.
J. econ. Ent., 1959, **52**: 586-7, bibl. 1.

New information is given on the biology of the weevil, which infested ornamentals in New Jersey in 1956 and 1957. Chlordane at 10 lb./ac. washed into the soil under privet and some other shrubs in October was ineffective.—Agric. Res. Serv., U.S.D.A.

2669. FLANDERS, S. E.
Biological control of *Saissetia nigra* (Nietn.) in California.
J. econ. Ent., 1959, **52**: 596-600, bibl. 16.

The upward trend of nigra scale infestation on ornamental trees and shrubs was drastically reversed following the introduction of the hymenopterous endoparasite *Metaphycus helvolus*.—Univ. Calif., Riverside.

2670. LÖFFLER, H.
Aralia elegantissima aus Samen. (***Aralia elegantissima* from seed.**)
Gartenwelt, 1959, **59**: 345, illus.

A method of raising *Aralia* [*Dizygotheca*] *elegantissima* from seed is described, by means of which quicker growth may be obtained. Grafted plants are marketed when 2–3 years old, whereas seedlings may be marketed after about 15 months.

2671. P—, F.
Vereinfachte Kulturmethode für *Aucuba japonica*. (**A simplified method of growing *Aucuba japonica*.**)
Gartenwelt, 1959, **59**: 344-5, illus.

Including propagation by cuttings.

2672. ENRIGHT, L. J.
Chemical aids rooting of barberry, magnolia.
Amer. Nurserym., 1960, **111**(2): 132-3.

Factors studied in these tests were time of taking the cuttings, position on the plant from which the cuttings were taken and concentration of growth substance. The cuttings were all rooted under mist in coarse sand on a greenhouse bench provided with soil heating; IBA was used as a 10-second dip. With the 5 *Berberis* species tested cuttings taken from relatively weak-growing plants and from the lower, shaded branches rooted best. Wounding the cuttings was of no value. With *B. sargentiana*, *B. thunbergi*, *B. t. atropurpurea* and *B. verruculosa* early spring and late autumn cuttings rooted equally well and 5,000 p.p.m. IBA gave the best results. With *B. julianae* the cuttings rooted best when taken in winter and treated with 10,000 p.p.m. IBA. With *Magnolia grandiflora* wounding was found to encourage rooting. Cuttings taken during late spring or early summer rooted best. Root development was directly proportional to the concentration of growth substance used, the percentage rooting in June being 0 with no IBA treatment and 84–88 within 63 days with the highest (20,000 p.p.m.) concentration. [See also *H.A.*, 29: 2809.]—Univ. Md, College Park.

2673. (ARMSTRONG, D. L.)
Sun-tolerant camellia.
Amer. Nurserym., 1960, **111**(2): 93-4.

Flirtation, a new *Camellia japonica* × *C. saluenensis* hybrid, with pink, semi-double flowers.

2674. FURMAN, T. E.
The structure of the root nodules of *Ceanothus sanguineus* and *Ceanothus velutinus*, with special reference to the endophyte.
Amer. J. Bot., 1959, **46**: 698-703, bibl. 25, illus.

These nodules differed from those of leguminous plants in being modified short roots, containing a filamentous organism, possibly a species of *Streptomyces*. [See also *H.A.*, 29: 3926.]—Esc. agríc. panamer., Tegucigalpa, Honduras.

2675. LENTZ, A. N.
Growing Christmas trees in New Jersey.
Ext. Bull. Coll. Agric. Rutgers Univ. **322**, 1959, pp. 16.

Suitable species, when and how to plant, subsequent treatment including pest and disease control, harvesting and marketing.

2676. VAN DRUNEN, E., AND KAMP, J. R.
Relation between pH of the rooting medium and photoperiod in the rooting of Hatfield yew.
Ill. St. Flor. Ass. Bull., 1959, No. 196, pp. 5-7, illus.

Using pH values of 5, 6, 7 and 8, and 8- and 16-hour photoperiods, it was found that at pH 5 and 6 rooting of *Taxus media* Hatfield was poor and day ngth had no effect. At pH 7 and, to a lesser tent, at pH 8 rooting was better and was markedly nproved by the 8-hour photoperiod, which at H 7 gave 60% more rooting than the 16-hour day.

77. Mahlstede, J. P.
New approach to container growing.
Amer. Nurserym., 1960, **111**(1): 11, 115-18, illus.

xus, juniper and thuja plants of 3 sizes were otted up in 5 media in polythene-lined wire con- iners or metal containers and were grown on in posed or shaded positions. The response of the ants to the different treatments over 2 years ried with the species, the size of the material at tting and the length of time in the containers. single medium cannot be recommended for all pes of container-grown evergreen.—Ia St. Coll., nes.

78. Coggeshall, R. G.
Whip and tongue graft for dogwoods.
Amer. Nurserym., 1960, **111**(2): 9, 56-9, illus.

tails are given on the raising and preparation the rootstock (*Cornus florida*), the grafting eration carried out in the greenhouse, and sub- quent care.

79. Smith, A. G., Jr.
Transplanting dogwood.
Leafl. Va poly. Inst. Ext. Serv. **95**, 1959, p. 1.

ctical advice.

80. Sauthoff, W., Kröber, H., and Maatsch, R.
Die Phytophthora-Krankheit der *Erica gracilis.* Ein Beitrag zur Frage des "Ericasterbens". (***Phytophthora* disease of *Erica gracilis.* A report on the problem of "erica death".)**
Gartenwelt, 1959, **59**: 321-3, bibl. 11, illus.

H.A., 30: 1082.

1. Hyche, L. L., and Arthur, B. W.
Systemic insecticides for citrus whitefly control on gardenia.
J. econ. Ent., 1959, **52**: 1008-10, bibl. 4.

periments were conducted over a 4-year period the control of citrus whitefly, *Dialeurodes citri,* 1-year-old *Gardenia jasminoides* var. *radicans* l var. Mystery. Foliage sprays of demeton %, methyl demeton 50%, Am. Cyanamid 08 and 12009 both 48%, and Delnav 25%, all he rate of 1 pt./100 gal., and white oil emulsion 2 gal./100 gal. gave highly effective control. l applications of demeton, Am. Cyanamid 08 and 12009, Thimet and Di-Syston were also ly effective. For best results 2 foliage or soil lications were necessary.—Ala. Polytech. Inst., c. Exp. Stat., Auburn.

2682. Galle, F. C.
Hollies suitable for small trees.
Amer. Nurserym., 1960, **111**(2): 7-8, 128-31, 136-9, illus.

Notes on species and varieties for the southern U.S.A.

2683. Schread, J. C.
Pod gall of honey locust.
Circ. Conn. agric. Exp. Stat. **206**, 1959, pp. 4, bibl. 4, illus.

Of 4 insecticides applied at 2 rates in May for the control of the first brood of *Dasyneura gleditschiae* on *Gleditschia triacanthos* 20% lindane at 1 pt. per 100 gal. water was best with 86% mortality. DDT 3% emulsion applied in April just before the leaves opened also gave very good control of first-brood midges but had no effect on the second brood.

2684. Sen, P. K., Bose, T., and Bose, R. N.
Effect of boron and molybdenum on rooting of semi-hardwood cuttings of *Justicia gendarussa* Linn.
Indian J. Plant Physiol., 1959, **2**: 21-8, bibl. 6.

Boron at 50 p.p.m. had a beneficial effect on both initiation and development of roots, when applied alone or together with NAA. Leafy cuttings showed a greater response than leafless cuttings. Molybdenum had no beneficial effect on rooting.—Calcutta Univ.

2685. Ljapunova, N. A.
Lilac collection in the botanical garden of the Ukrainian Academy of Science. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 27-30.

Varities classified in 3 groups.

2686. Kiseleva, V. G.
Flowering of lilac varieties in the botanical garden of the Ukrainian Academy of Science. [Russian.]
Bjull. glav. bot. Sada, 1959, No. 35, pp. 23-7.

Records made on 40 lilac varieties showed that on average each full-grown lilac bush produced 135 racemes, weighing more than 8 kg. In the single varieties each flower cluster contained 106–384 flowers, and in the double varieties 139–321.

2687. Forsberg, J. L.
Poinsettia diseases.
Ill. St. Flor. Ass. Bull., 1959, No. 196, pp. 7-9, bibl. 10, illus.

Symptoms of root and stem rots caused by *Rhizoctonia solani*, *Pythium* spp. and *Thielaviopsis basicola*, of bacterial canker caused by *Corynebacterium poinsettiae* and of scab caused by *Sphaceloma* sp. are described. Control is by strict sanitation, and for root and stem rots by steam sterilization or ferbam treatment of propagating benches and medium and the use of new or sterilized pots. High soil moisture, pH values of 6·2–7·2 and temperatures below 60° F. favour root rots.

2688. BATEMAN, D. F., AND DIMOCK, A. W.
The influence of temperature on root rots of poinsettia caused by *Thielaviopsis basicola, Rhizoctonia solani,* and *Pythium ultimum.*
Phytopathology, 1959, **49**: 641-7, bibl. 34, illus.

A soil temperature of 26° C. produced the best root growth in healthy plants. *Thielaviopsis* and *Pythium* rots were most severe at 17° C. *Rhizoctonia* rot increased as the temperature was raised from 13° to 30° C.—Cornell Univ., Ithaca, N.Y.

2689. ROYAL HORTICULTURAL SOCIETY.
The rhododendron and camellia year book, 1960, No. 14.
R.H.S., London, 1959, 9 × 5½ in., pp. 176, illus., 12s. 6d. + 1s. 3d. postage, or U.S.A. $2 post free.

The chief item in this volume is a symposium on the aims and methods of breeding hybrid rhododendrons and azaleas, to which many well-known breeders have contributed their experience. There are also a number of interesting articles on rhododendrons and camellias in Portugal, New Zealand and the U.S.A., at the Edinburgh Botanic Garden and in some famous private gardens in Britain. Authoritative descriptions and historical notes are given on 39 varieties of *Camellia japonica.* A fascinating item for the Curious Gardener is the record of a *Rhododendron ponticum* plant thriving and flowering as an epiphyte on the trunk of a cork oak in Wales. An article on the propagation of rhododendrons by budding in the open has been abstracted separately.

2690. SALIMEI, F. S.
Le azalee a fioritura forzata e stagionale. **(Azaleas for forcing and for flowering in season.)**
Ital. agric., 1960, **97**: 66-70, illus.

Species and varieties grown in Italy.

2691. TICKNOR, R.
Plant bands aid propagation of rhododendron cuttings.
Amer. Nurserym., 1960, **111**(1): 18.

Cuttings of *Rhododendron catawbiense grandiflora* were rooted under mist in a sand/sphagnum mixture in 2 × 2 × 3-inch Bird paper bands, 2 × 2 × 3-inch basswood bands, 1¾ × 1¾-inch Val-Peat pots, or directly in the cutting bench. The degree of rooting was in the following descending order: wooden bands, cutting bench, paper bands, peat pots. The use of plant bands means less disturbance before planting out and fewer losses at transplanting than rooting directly in the cutting bench, but fewer cuttings can be grown per unit area.—Ore. St. Coll., Corvallis.

2692. DRUECKER, J. S.
The propagation of rhododendrons by budding.
J. Calif. hort. Soc., Vol. 19, No. 4, reprinted in *R.H.S. Rhododendron Camellia Yearb. 1960, No. 14,* 1959, pp. 69-70.

A method which has been used successfully for a number of years by an American nurseryman is described. Two-year-old plants of *Rhododendron fortunei* are used as rootstocks. They are budded in the open between the middle of July and the end of August, using a T-cut as near the base as possible. The plants must be kept well watered. The stocks are headed back before growth starts the following spring. The results vary with the variety, but the percentage take is generally greater than with the traditional method of grafting under glass. Other advantages are that no heat is necessary, the stocks need not be potted up, less scion wood is required and the operation is 2 or 3 times faster than veneer grafting.

2693. VOGEL, W., AND BERNET, R.
Das Wurzelsterben bei Azaleen, eine durch Nematoden verursachte Krankheit. **(Root die-back in azaleas, a disease caused by nematodes.)**
Reprinted from *Schweiz. GartenbBl.*, 1958, No. 13, pp. 3, illus.

The symptoms are described of a disease of azaleas which was shown to be caused by a *Tylenchorhynchus* sp., probably *T. claytoni.* Excellent control was achieved with a 10% Nemagon dust applied at the rate of 14 kg./100 sq. m.—Eidg. Versuchsanst., Wädenswil, and Dr. Maag AG., Dielsdorf.

2694. STRINGER, J. M.
Nut leaf weevil, *Strophosomus,* and related species defoliating Japanese azaleas.
J. roy. hort. Soc., 1959, **84**: 332-3.

Complete control obtained with a single application of 25% miscible DDT at 2 pints per 100 gal.

2695. BESTAGNO, G.
Defogliazione dello *Schinus molle* L. da salsedine marina. **(Defoliation of *Schinus molle* by sea water.)**
Not. Mal. Piante, 1959, No. 49/50, pp. 143-4, illus.

It has proved possible to reproduce the defoliation noticed in the California pepper tree in the Mediterranean by spraying with sea water.

2696. (HARRIS, H. M.)
Spirea leaf roller damaging to ornamentals.
Ia Fm Sci., 1959, **14**: 345, illus.

Control of caterpillars, including *Evora hemidesma,* on nursery plants of *Spiraea vanhouttei* has been obtained by applying 2 lb. DDT or Guthion, or lb. Rhothane, per 100 gal. at weekly intervals r 4 weeks. [See also *H.A.*, 29: 1774k.]

97. WYMAN, D.
Viburnums.
Arnoldia, 1959, **19**: 47-56, illus.

e flowering time of hardy species, and types ommended for habit, foliage, fruits and shade. e also *H.A.*, 30: 1107.]

2698. CHOPINET, R.
Les vignes-vierges (*Ampelopsis* et *Parthenocissus*). **(Virginia creepers (*Ampelopsis* and *Parthenocissus*).)**
Jardins Fr., 1959, **5**: 170-5, illus.

The species are classified according to their need for support, decorative foliage, vigour, and decorative fruits. Each is described, and brief notes are given on cultivation.

SUB-TROPICAL FRUIT AND PLANTATION CROPS

General.

99. GOOR, A.
Fruits of Israel. [Hebrew, with notes in English.]
[*Publ.*] *Dep. Hort. Minist. Agric. Israel, Hakirya*, 1959, pp. 133.

tails are given of some 30 fruit species cultivated Israel. The botanical and popular names of the its are given, the latter in Hebrew, English, nch, German, Russian, Arabic and Yiddish. e areas covered by them in Israel and their yield tons per dunam are given in English. Their gins and cultural requirements in Israel together h costs of production are then detailed in brew, and the pests and diseases from which species suffer in Israel are listed by their scientific l Hebrew names.

Avocadoes.

(*See also* 1535, 1620, 2800, 2818, 3046.)

0. DAVENPORT, J. B.
Chemical changes during growth and storage of the avocado pear.
From abstr. in *Aust. J. Sci.*, 1958, **21**: 118.

most striking change during growth of the t is the rapid increase in oil content. Changes ing storage depended on the stage of development of the fruit and always involved a disappeare of the C_7 sugars. Evidence is also presented the presence of a considerable amount of lipids new type.

Carobs.

1. TICHO, R. J.
Report to the Government of Cyprus on carob production.
Rep. FAO/ETAP **974**, Rome, 1958, pp. 24, bibl. 12, illus.

ob growing is fully described. The recomdations cover variety trials, pollination studies, ning practices, soil studies, vegetative propaga- and pest control. The expansion of dates and anas in Cyprus is also suggested.

2. BINDER, R. J., AND OTHERS.
Carob varieties and composition.
Food Technol., 1959, **13**: 213, bibl. 21, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-100.

The 30 carob varieties analysed contained high amounts of sugars (sucrose and invert) compared with other fresh fruits in harvest-ripe condition. Owing to the protein and carbohydrate contents of the pod flesh, carobs compare favourably with barley in nutritive value.

2703. (GRANITI, A.)
La nebbia del carruba. **(Cloud in carobs.)**
Inf. fitopat., 1959, **9**: 316-17, illus.

Observations in Sicily on this most serious disease caused by *Oidium ceratoniae* show that considerable differences exist in varietal susceptibility. Efficient control is obtainable by sulphur or potassium pentachloride treatment but is uneconomic under present conditions of cultivation. Selection is therefore advised of resistant strains, and hermaphrodite rather than male plants should be used as pollinators as showing more resistance to the disease.

Citrus—general.

(*See also* 1607, 1737, 2800, 3043.)

2704. GOREUX, L., AND WOLF, J.
Market prospects for citrus fruit in Western Europe in 1965.
Mon. Bull. agric. Econ. FAO, 1959, **8**(11): 1-11.

Prospects for production, exports and markets are discussed. Compared with the present average (1955/58) annual import into Western Europe of 2,267 thousand metric tons the estimate for 1965 lies between 2,760 and 2,930.

2705. DUPIGNY, C.
The citrus industry of Dominica.
Windward Is Annu. 1959-60, pp. 51-3, illus.

A short popular account.

2706. MILELLA, A.
Alcuni aspetti dell'agrumicoltura spagnola. **(Some aspects of citrus growing in Spain.)**
Stud. sassar., Sez. III, 1958, 1959, **6**: 76-93, bibl. 8, illus.

Distribution, production, cultural practices and varieties.

2707. Randhawa, G. S., and Kahlon, A. S.
Price spreads in marketing of citrus fruit in India.
Indian J. Hort., 1957, **14**: 108-18, bibl. 9, [received 1959].

Problems of variation in market prices and their possible solution. [For market research, see *H.A.*, 27: 2087s.]

Citrus—varieties and propagation.

(*See also* 1619, 2742, 2747, 2748.)

2708. (Reece, P. E., and Gardner, F. E.)
Three new early-maturing tangerines developed by USDA.
Citrus Mag., 1959, **22**(4): 5, 12.
New early maturing tangerine varieties.
Fruit Var. hort. Dig., 1959, **14**: 22.
Three new tangerines.
Agric. Res. Wash., 1960, **8**(8): 15.

Descriptions are given of Robinson, Osceola and Lee, hybrids obtained by crossing Clementine tangerine with Orlando tangelo. In Florida the earliest of the three, Robinson, reaches prime eating condition in late October.—U.S.D.A.

2709. Randhawa, G. S., Singh, J. P., and Seshadri, V. S.
A promising new bud mutant in Foster grapefruit (*Citrus paradisi* Macf.).
Indian J. Hort., 1958, **15**: 59-60, bibl. 3.

A seedless bud mutant, with a higher juice content than its parent, to be called the Pusa Foster Seedless.

2710. Singh, J. P., and Randhawa, G. S.
Some interesting bud variations in citron (*Citrus medica* L.).
Indian J. Hort., 1958, **15**: 19-21, bibl. 17, illus.

Changes in fruit characters with possible commercial value are described.

2711. Randhawa, S. S., and Bajwa, B. S.
Embryo counts and their germination in important polyembryonic citrus rootstocks.
Indian J. Hort., 1958, **15**: 61-5, bibl. 8.

Among 5 rootstocks the Jamberi selection of rough lemon had the highest average number of embryos per seed (5·9). The average of a second rough lemon selection (Jatti khatti) and of *C. karna* stocks was 5·3; a third rough lemon (Jullunduri khatti) contained 4·2, and sour orange averaged 2·9 embryos per seed. Germination percentages were directly related to embryo size, the largest embryos having the highest capacity. Sand was the best medium for testing embryo viability.—Fruit Sect., Jullundur, Punjab.

2712. Dubrovickaja, N. I., and Krenke, A. N.
The importance of phasic development of suckers in the propagation of lemons by cuttings. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 65-72, bibl. 22, illus.

Lemon shoots from 1½ months to 2 years old will develop roots when planted, but shoots 4–10 months old proved most satisfactory. For spring planting shoots that appeared late in the previous year were best, and for autumn planting the first shoots to have appeared in the same year. Cuttings with leaves rooted faster than leafless cuttings.

2713. Marloth, R. H.
Citrus rootstock research in South Africa.
Reprinted from *5th int. Congr. Medit. Citrus Grs*, Catania, 1959, pp. 13, bibl. 17.

The summarized data presented came from 862 trees in 16 of the main rootstock plantings over a period of 20 years. The scions were different lines of navels, Valencias, midseason oranges and grapefruit on a number of sweet orange, rough lemon, mandarin and trifoliata rootstocks. The fruit quality data came from over 3,600 samples of the same trees. Trees on rough lemon came into bearing earlier than trees on the other stocks, but after 20 years trees on sweet orange out-yielded them. Trees on mandarin gave yields equal to the best of trees on the other stocks. Fruit from trees on rough lemon was poorest in fruit quality, having thinner rinds, less juice and lower total soluble solids than fruit from trees on the other stock types. Fruit from trees on trifoliata possessed the highest quality. Fruit from trees on mandarin had a higher TSS/acid ratio than fruit from trees on rough lemon or sweet orange. [From author's summary.]—Citrus subtrop. hort. Res. Stat., Nelspruit.

2714. Rangacharlu, V. S., Naidu, N. A., and Rao, T. L. N.
Performance of Sathgudi orange (*Citrus sinensis* Osbeck) on different rootstocks at Kodur (South India).
Indian J. Hort., 1958, **15**: 35-58, bibl. 13.

Observations on an 18-year-old rootstock trial are summarized to show the effect of 20 rootstocks on growth, cropping, disease incidence and fruit quality of Sathgudi sweet orange. Sweet orange is considered the most promising rootstock for commercial groves.—Fruit Res. Stat., Anantharajupet.

2715. Randhawa, S. S., and Bajwa, B. S.
Histology of bud-union in citrus.
Indian J. Hort., 1958, **15**: 4-5, bibl. 3, illus.

Bud-unions of Blood-red and Jaffa oranges on *C. karna* stocks collected 2 and 6 weeks after budding showed no abnormalities in tissue growth which might indicate incompatibility. It is conidered that the reported incompatibility between Blood-red scions and *karna* stock may be of a delayed type.—Fruit Sect., Jullundur, Punjab.

716. Čanturija, —.
Some advantages of growing orange trees on their own roots in comparison with grafted trees. [Georgian.]
Sakartvelos Kolmeurne, 1957, No. 6, p. 27, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 73,190.

Of 230 orange trees grown on their own roots in Abhazia the majority showed vigorous growth, high frost resistance, resistance to fungal diseases nd pests, high yields and good quality fruit. During the severe winter of 1949/50 such trees overwintered much better than those grafted on frost resistant rootstocks. The latter were less vigorous being only 5–6 m. high compared with 14–15 m. for trees on their own roots.

Citrus—planting, environment, irrigation and pruning.

(*See also* 2735.)

717. Savage, Z.
Some considerations regarding setting distances.
Citrus Mag., 1959, **22**(4): 18-19, 28-9, 32.

Comparisons are given of the annual and cumu- tive yields/acre of commercial groves planted at densities, namely, less than 50 trees/acre (average) and 90–99 trees/acre. The annual yields from de-spaced groves were still increasing after years, whereas in close-spaced groves yields arted decreasing after the 24th year. Cumu- tive yields over the 49 years, however, were gher for the close-spaced groves. The author ggests that greater cumulative yields would be tained if groves were initially close-spaced and e alternate trees gradually pruned back and entually cut out after approximately 39 years.—a agric. Exp. Stat.

18. Murinson, B. Ju.
A trial on growing citrus species in a glass-house soil. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 110-11.

- to 15-year-old lemon, orange, and mandarin es successfully transplanted during dormancy.

19. Bryzgalov, E. A.
The influence of light conditions on the size and development of lemons grown in trenches. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 31, pp. 105-9, bibl. 8.

e shoot growth made by lemon trees in trenches n. wide was much greater when the trees were nted near the north wall of the trenches than en they were planted in the centre. Inadequate light was the main factor causing general leaf fall. Supplementary artificial illumination for 5 hours daily during the autumn-winter period checked the leaf fall completely.

2720. Krishnamurthi, S., and Kulasekharan, M.
Some observations on growth cycles in certain species and varieties of citrus grown at the experimental orchard of the Annamalai University.
Indian J. Hort., 1957, **14**: 187-95, bibl. 1, [received 1959].

Growth studies with 7 varieties of 5 species showed that definite growth cycles occurred under Indian conditions. There were wide variations in the time that growth started and in the duration of a flush. The sum total of shoot growth in each type, however, increased with the accumulated rainfall.

2721. Wedding, R. T., and Erickson, L. C.
Water stress and leaf drop.
Calif. Agric., 1960, **14**(1): 7, illus.

In experiments in a controlled temperature (80° F.) room, which were repeated in a shaded lath-house and in full sunlight, rooted cuttings of Washington Navel and Valencia oranges in 1 gal. cans were allowed to dry out for periods of up to 8 days. Rewatering at the end of an 8-day dry period caused severe leaf drop of apparently healthy leaves. Longer dry periods caused some wilting and rolling of leaves, but on rewatering apparently healthy leaves dropped before the wilted ones. Leaf blades abscissed at their point of attachment to the petioles, which also fell a few days later. These reactions of plants grown in containers were very similar to symptoms observed in the field following periods of moisture stress.

2722. Stolzy, L. H., and others.
Placement of tensiometers.
Calif. Citrogr., 1959, **45**: 39, 48, 50-1.

Tensiometers in citrus orchards should be placed in the drip lines of vigorous trees which have other healthy trees as neighbours. Suitable trees should be selected from parts of the orchard with noticeably different soil conditions. At each site 2 tensiometers should be installed, one at 12–18 in. and the other at 24–36 in. These should give all the information needed for successful irrigation. [See also *H.A.*, 28: 1841i.]—Univ. Calif., Riverside.

2723. Ruiz Zorilla, L. R.
Riego de naranjos y otros frutales por surcos de contorno. (**Irrigation of orange and other fruit trees by contour furrows.**)
Hojas divulg. Minist. Agric. Madrid **8-59** H, 1959, pp. 24, illus.

Advice on the construction of channels and furrows, and on planting systems and water control.

2724. Gvazava, Š. T.
The growth, development and fruiting of young orange trees in relation to methods of soil management in the interrows. [Russian, with English summary.]
Bjull. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur, 1957, No. 1, pp. 116-43, bibl. 33, from *Ref. Ž.* (*Biol.*), 1958, No. 16, Abstr. 73,189.

Six methods of soil management were compared. The results showed that soil moisture was highest, top and root growth most vigorous and fruit set best under two mulch treatments, viz. a mulch of organic material throughout the year and a black paper mulch until August followed by annual grasses. The soil dried out and growth was least satisfactory under perennial grass-legume cover crops.

2725. Dubrovickaja, N. I., and Krenke, A. N.
The effect of pruning on the structure and respiration of lemon shoots. [Russian.]
Bjull. glav. bot. Sada, 1958, No. 32, pp. 72-9, bibl. 13, illus.

Pruning changes the structure and metabolism of lemon trees. Immediately after pruning shoot growth is depressed, but the subsequent growth of lateral shoots is similar to that of unpruned trees. The activity of respiratory enzymes is also lowest after pruning, but later it increases and surpasses that of unpruned trees. The total amount of N and of sugars is higher in shoots of pruned trees.

Citrus—nutrition.

(*See also* 1686, 2741.)

2726. Satō, K., Ishihara, M., and Kurihara, A.
Studies on the leaf analysis of fruit trees. Effect of fruiting on the leaf analysis. [In English.]
Japanese Potassium Symposium, 1957, pp. 103-16, bibl. 13.

The effects of fruiting on the N, P and K contents of different parts, particularly the leaves, of young Satsuma orange trees were studied in pot experiments, using soil and sand cultures, the former with and without added K. In each case half the trees were prevented from fruiting by removing the flower buds. The addition of K to the infertile soil reduced new vegetative growth and the number of fruits produced, and increased the fruit K content, weight and size, and foliar K, particularly in the young leaves. Fruiting restricted shoot growth and increased foliar N and P. It decreased foliar K, slightly at first, but very markedly later, particularly where K was not added. The total K uptake by vegetative parts was 40–58% lower in fruiting than in non-fruiting trees, N uptake was 30–39% lower and P uptake 35·8–42·6% lower. For whole trees, including fruit, the differences were smaller, that in N uptake being very slight. [For earlier work, see *H.A.*, 27: 755.]

2727. Smith, P. F.
How to grow quality citrus fruit by fertilization.
Citrus Mag., 1959, **22**(3): 16-17, 23, bibl. 3.

In Florida annual dressings of 150–200 lb. N/acre are generally sufficient for maximum production of high quality fruit. Dressings of 20 lb. P_2O_5/acre/year replace the P removed in the crop, and larger applications which would coarsen the fruit should be avoided. Excessive K lowers fruit quality by increasing fruit size, and applications of this element should be about equal to those of N. —U.S. hort. Stat., Orlando, Fla.

2728. Jones, W. W., and others.
Nitrogen-yield-quality relations.
Calif. Citrogr., 1959, **45**: 40, 56-8, bibl. 4.

Fertilization studies in a Washington Navel orchard showed no decrease in yields after annual dressings of only ½ lb. per tree of actual N for 6 years. As this amount of N is removed annually in the crop, however, 1 lb. per tree is recommended. More than 1 lb. N per tree reduced fruit quality by thickening the peel and decreasing juiciness. In N-starved trees the largest leaf-N content was found in August-September, the usual sampling period. Maximum differences in leaf N resulting from different levels of fertilization were found shortly after the flowering and fruit-setting period (May–June). [See also *H.A.*, 28: 768.]—Univ. Calif., Riverside.

2729. Bouma, D.
The development of the fruit of the Washington Navel orange.
Aust. J. agric. Res., 1959, **10**: 804-17, bibl. 14.

Four nitrogen levels (0–16 lb. $(NH_4)_2SO_4$/tree) were supplied. Peel thickness reached a peak 11 weeks after blossoming, but then became progressively thinner until the 23rd week. The rate of thinning increased with decrease in N supply. From the 23rd week onwards peel thickness increased again at the highest N level but continued to decrease at the lowest level. Dry weight of the peel increased more rapidly at the higher than at the lower N levels. Nitrogen levels greatly affected the supply of N to the peel but not to the pulp. The quantities of P moving to the pulp were higher at the lower N levels. The deleterious effects on fruit quality of excessive N supply are discussed.—C.S.I.R.O., Griffith, N.S.W.

2730. Botham, J. R.
Manuring citrus trees.
J. Agric. S. Aust., 1959, **62**: 315-18.

Recommendations for application of urea, preferably through overhead irrigation lines, for foliage spraying with Zn and Mn, and for cover cropping with annual medics.

2731. KLIMENKO, K. T., AND BOGOLJUBOVA, V. D.
The effect of microelements on the growth of citrus seedlings. [Russian.]
Bjull. glav. bot. Sada, 1957, No. 29, pp. 85-7, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,878.

Citrus seedlings growing in soils of pH 7–8·5 were prayed with fertilizer solutions every 10 days from uly to November. With 1-year-old *Citrus junos* plants the best results were obtained with NPK + Mn + B and Mn + B, and with 2-year-old plants with Mn and Mn + B. For 2-year-old trifoliate oranges NPK + Mn + B and Mn, and for lemons ulphates of Cu and Zn and Cu + Zn + Mn, were he most effective.

732. LIEBIG, G. F., JR., BRADFORD, G. R., AND VANSELOW, A. P.
Effects of arsenic compounds on citrus plants in solution culture.
Soil Sci., 1959, **88**: 342-8, bibl. 13, illus.

emon plants grown in solution cultures were very ensitive to additions of arsenic. One p.p.m. of ther arsenate or arsenite As stimulated root rowth; 5 p.p.m. of arsenite As and 10 p.p.m. of rsenate As were definitely toxic and adversely ffected both root and top growth. The only nusual leaf symptoms were burned spots which eveloped occasionally during periods of hot eather. Where the As concentrations in the ltures were toxic, vein chlorosis, generally dicative of root injury, was evident on the leaves. he maximum As content of plant parts was p.p.m. in old leaves and 1,200 p.p.m. in roots. is suggested that, since citrus plants are deep-oted, it is doubtful if As toxicity will be observed field trees. [From authors' summary.]—Citrus xp. Stat., Riverside, Calif.

33. JURAS, I.
Utjecaj gnojenja na klorozu podloge *Poncirus trifoliata* L. (**The effect of manuring on lime-induced chlorosis of *Poncirus trifoliata***). [English summary 8 lines.]
Zemlj. Bilj., 1958, **7**: 347-50, bibl. 9.

n calcareous soils chlorosis of citrus on *P. tri-iata* rootstocks was reduced more effectively by e application of liquid manure than by NPK. eatment with S caused little improvement.

34. CARPENA, O., ORTUÑO, A., AND LOUSTAU, J.
La estructura de los cloroplastidios de hojas de *Citrus*. II. Limonero con deficiencias minerales. (**Structure of the chloroplasts of citrus leaves. I. Mineral-deficient lemons.**)
An. Edafol. Fisiol. veg., 1959, **18**: 329-45, bibl. 30, illus.

e parenchyma cells of Fe-deficient and Mn-ficient leaves contained abundant mitochondrial dies, mostly at the proplast stage of development. e chloroplasts of healthy and of deficient leaves were markedly different. It was concluded that in Verna lemons Fe deficiency inhibits chloroplast formation. [For part I, see *H.A.*, 29: 1870q.]—Centr. Edafol. Biol. apl. Segura.

2735. MUNGOMERY, W. V.
Salt damage to citrus.
Qd agric. J., 1959, **85**: 549-52, illus., and *Fruit World, Melbourne*, 1959, **60**(10): 47-8.

Salt damage to citrus trees in Queensland is usually caused by the use of saline irrigation water. Where no other water is obtainable, watering by sprinkler at dusk, dawn or at night is recommended to prevent salt absorption by the leaves, together with heavy irrigation rates to wash the salt to lower soil levels. Where the crumb structure has been affected gypsum should be applied to restore the Ca content. Long term remedies are the replacement of the salt sensitive lemon by oranges or grapefruit and the use of sweet orange or Emperor mandarin as rootstocks rather than rough lemon.

Citrus—fruit development, characters and composition.

(*See also* 1535, 1741, 2729.)

2736. HAR-EVEN, E., AND MONSELISE, S. P.
A study on the drop of Shamouti (Jaffa) oranges from fruit set to harvest.
Reprinted from *5th int. Congr. Medit. Citrus Grs*, Catania, 1959, pp. 6.

The principal factor affecting fruit drop was low RH; high temperature was secondary. Most of the fruit shed prior to May 8 dropped with the pedicel; subsequently, the proportion dropping without the pedicel rapidly increased to reach 90% by June 26. Only 10·5% of dropping fruit was visibly fungal-infected, and no other reason for dropping was apparent. A notch on the pedicel of young fruits was often noted. If drop did not occur pedicel thickening and obliteration of the notch took place. Colour differences between dropping and developing fruitlets were noted. The losses of dry matter, N and P through drop are indicated, and the effects of mechanical injuries and growth regulators on drop are discussed. Thinning trees from 4 × 4 m. to 4 × 8 m. spacing reduced fruit drop by nearly 50%.—Hebrew Univ., Rehovot.

2737. RANDHAWA, G. S., SINGH, J. P., AND MALIK, R. S.
Fruit cracking in some tree fruits with special reference to lemon (*Citrus limon*).
Indian J. Hort., 1958, **15**: 6-9, bibl. 17, illus.

Radial and transverse cracking has been observed in lemons, but the radial type is more common. The Italian lemon was particularly subject to fruit cracking (31·8%), followed by Eureka (28·8%), Seedless (25%), Malta (21·3%), Nepali oblong (12·5%), and Genoa (6·9%). Cracking was associated with heavy rains following a dry period. Frequent and light irrigation during the dry period of April–June and early picking of the crop as it approaches maturity are recommended.—Indian agric. Res. Inst., New Delhi.

2738. MONSELISE, S. P.
Some properties of citrus fruit peel and their dependance upon climate, season, variety, rootstock and other factors.
Reprinted from *5th int. Congr. Medit. Citrus Grs*, Catania, 1959, pp. 6

With increasing air dryness and mean temperature peel resistance to pressure increased and its moisture content decreased. Resistance to diseases and pests appeared to be linked with resistance to pressure. No change in peel moisture percentage during fruit development was found, but a continuous decrease in resistance to pressure was noted especially during ripening. Thickness of peel and its moisture content were generally unrelated.—Hebrew Univ., Rehovot.

2739. LONG, W. G., AND OTHERS.
Variations in quality of Marsh grapefruit.
Citrus Ind., 1959, **40**(11): 9-10, 18-20, bibl. 29.

Examination of 3,800 Marsh grapefruit showed that total soluble solids, titratable acid and ascorbic acid were inversely related to size and that fruit weight, diameter, volume of juice, and texture of flesh were interrelated. Variations in fruit weight, volume of juice, solids, acid, solids to acid ratio and ascorbic acid were greater among samples than between sizes and greater in spring than in autumn fruit. Substantial differences between crop years were also found. Data are presented for the ranges in physical measurements and chemical analyses.—U.S.D.A. agric. Mktg Service.

2740. STANLEY, W. L., AND VANNIER, S. H.
Effects of environmental and processing factors on the citral content of lemon oil.
Food Technol., 1959, **13**: 96-9, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-53.

The total carbonyl content was consistently higher in processed oils from a coastal area than in oils from arid inland areas.

Citrus—diseases.

(*See also* 2772-2774, 2800.)

2741. ROSETTI, V.
O tratamento dos pomares cítricos. (**Treatment of citrus groves.**)
Biológico, 1959, **25**: 59-63.

Treatments are recommended for the control of epiphytic algae, fungi and lichens, various virus and fungus diseases, insect and mite pests and Zn deficiency.

2742. MARTÍ FABREGAT, F.
Sobre un programa de certificación de injertos en los agrios. (**A programme of certification of citrus scions.**)
Conf. Inst. nac. Invest. agron. Madrid, 1957-58, 1958, pp. 5-17.

A review, with many references to virus regulations in Florida and California.

2743. ECONOMIDES, C. V., AND RUCK, H. C.
Virus diseases of citrus in Cyprus.
Countryman, Nicosia, Sept. 1959, pp. 14-17, illus.

Xyloporosis, little leaf and psorosis.

2744. REICHERT, I.
Rapport sur les résultats d'une étude faite en Espagne sur les virus et les autres affections des agrumes sous les auspices de l'E.P.P.O. (**Report on the results of a study made in Spain on the virus and other diseases of citrus under the auspices of the E.P.P.O.**)
Fruits et Prim., 1959, **29**: 96-107.

The disease mainly encountered was xyloporosis. General recommendations on crop improvement are made.

2745. SIBILIA, C.
Indagini sulla diffusione della xiloporosi degli agrumi in Italia. (**Investigations on the distribution of xyloporosis of citrus in Italy.**)
Bol. Staz. Pat. veg., 1958 (issued 1959), **16**: 183-94, illus.

Districts and varieties affected.

2746. REICHERT, I.
De la maladie dite "Stubborn" des agrumes dans les pays méditerranéens. (**On the so-called "stubborn" disease of citrus in Mediterranean countries.**)
Fruits et Prim., 1959, **29**: 108-10, bibl. 11.

Considered to be identical with little leaf and xyloporosis diseases [see also *H.A.*, 29: 1836].

2747. LEWIS, H. C., AND SHILLING, W. E.
Increasing loss due to quick decline.
Citrus Mag., 1959, **22**(3): 12.

A marked increase in the loss of orange trees on sour orange rootstocks infected with tristeza has occurred in California. The most efficient vector, the black citrus aphid, does not occur in California, where spread is thought to be due to the melon aphid. As aphid control is impracticable, control must be by replanting with suitable resistant rootstocks.

2748. PEIRIS, J. W. L., AND BERTUS, A. L.
The tristeza disease of citrus in Ceylon.
Trop. Agriculturist, 1958, **114**: 221-9, bibl. 16.

Sweet orange scions were found to decline on sweet orange stocks as well as on their own roots, and this decline was transmissible by grafting and by the black citrus aphid, *Toxoptera citricidus*. The rus responsible also produced a characteristic ntinuous vein clearing on seedlings of various ange varieties and is considered to be a virulent rain of tristeza.

49. NORMAN, P. A., AND GRANT, T. J.
Transmission of T_3 severe strain of tristeza virus of citrus by the melon aphid.
J. econ. Ent., 1959, **52**: 632-4, bibl. 14, illus.

phis gossypii was found to transmit the T_3 severe rain of tristeza from infected pineapple orange, eopatra mandarin and rough lemon seedlings to ey lime indicator plants.—Agric. Res. Serv., S.D.A., Orlando, Fla.

50. KRAMER, M.
O emprego de ervicidas na campanha de erradicação do "cancro cítrico". **(Use of herbicides in the campaign for the eradication of citrus canker.)** [English summary ½ p.]
Biológico, 1959, **25**: 91-7, illus.

hen 3 products were compared for destroying ected trees, the best results were obtained with fenox, a 2,4,5-T ester, which gave an apparent 0% kill of orange trees when sprayed on the nks at 4% or on the foliage of root suckers at in diesel oil in late March.

51. (LOEST, F. C.)
Black spot on citrus.
Fmg S. Afr., 1959, **35**(9): 45.

ree sprays of bordeaux and oil, at petal drop and n at 6-week intervals, gave effective control.

Citrus—pests.

(*See also* 2741, 2775, 3073.)

52. UNION OF SOUTH AFRICA DEPARTMENT OF AGRICULTURE, DIVISION OF ENTOMOLOGY.
Eelworm a threat to citrus and deciduous fruit.
Fmg S. Afr., 1959, **35**(9): 6-8, illus.

e need to establish orchards on eelworm-free is stressed, since the recognized control subances are of no use in established orchards. ontrol is generally obtained with EDB, methyl mide, DD and Nemagon. Methyl bromide especially suitable for seedbeds. *Eragrostis vula* (Ermelo type) grass is entirely resistant, after a ley of 3 or more years susceptible crops y be planted with only very slight infestation.

3. (REYNOLDS, H. W., AND O'BANNON, J. H.)
Control for a citrus pest.
Agric. Res. Wash., 1959, **7**(12): 12-13, illus.

ectoparasitic citrus nematode in Florida can be trolled by adding DBCP to the irrigation water. ntrol was good at 2 gal. per acre and nearly % at 10 gal., and the effects of treatment should for at least 5 years. Excessive doses are otoxic. Results were considerably enhanced edging and pruning after DBCP treatment.— . agric. Exp. Stat., Tempe.

2754. LUPO, V.
Gli insetti dannosi agli agrumi e mezzi per combatterli. **(Insect pests of citrus and means of controlling them.)**
Tecn. agric., 1959, **11**: 89-104, 187-203, illus.

The biology and control of thrips (*Heliothrips haemorrhoidalis*), 16 species of scale insects, 2 moths (*Prays citri* and *Cryptoblabes gnidiella*), the beetle *Otiorrhynchus cribricollis*, the fruit fly *Ceratitis capitata*, the ants *Tapinoma nigerrimum* and *Iridomyrmex humilis*, and the mites *Tetranychus telarius* and *Aceria sheldoni* are described. Chemical and biological control methods are given for scale insects.

2755. BINDRA, O. S.
Insect pests of citrus and their control.
Indian J. Hort., 1957, **14**: 89-98, bibl. 5, illus., [received 1959].

White flies, psylla, fruit sucking moths, leaf miner, lemon butterflies, stem borer and lime tree borer.

2756. ANON.
Citrus aphids (*Toxoptera aurantii* and *Aphis citricidus*).
Agric. Gaz. N.S.W., 1959, **70**: 332.

Most injury occurs to young growth in the spring. Autumn attacks may also be severe. Spray programmes should not adversely affect natural enemies such as ladybirds or syrphid larvae. Suitable insecticides include malathion and Metasystox. One recommended spray consists of 1 pint nicotine sulphate and 5 lb. soft soap (or ½ gal. white oil emulsion) in 100 gal. A formula which also gives control of scale insects, citrus bugs and citrus butterfly caterpillars is 4 lb. malathion 25% w.p. and 1¼ gal. white oil in 100 gal.

2757. FLANDERS, S. E.
***Pseudococcus citriculus* Green and its parasites.**
J. econ. Ent., 1959, **52**: 880-2, bibl. 16.

An historical review.

2758. RATAUL, H. S.
A note on endrin against citrus psylla (*Diaphorina citri* Kuw.) Hemiptera: Psyllidae.
Indian J. Hort., 1957, **14**: 185, bibl. 2, [received 1959].

Endrin was particularly effective and sprays of 0·02% emulsion had a residual effect 72 hours after treatment.—Govt agric. Coll., Ludhiana, Punjab.

2759. GEORGALA, M. B.
Advances in fruit fly control. Large scale use of South African protein attractant.
Citrus Gr, 1959, No. 308, pp. 7-11.

In view of the incompatibility of Staley's Sauce No. 7 with certain copper sprays [see *H.A.*, 29: 3978] tests have been made of Drum Dried Solubles which is made from pilchards. It has proved a good attractant and 6 lb. per 100 gal. was superior to Staley's Sauce at 2 pints per 100 gal. Furthermore it can be used throughout the year, is relatively cheap and is the most compatible of the protein materials tested with copper residues. Of the toxicants tested Dipterex 50% w.p. and malathion 50% emulsifiable liquid, in addition to malathion 25% w.p., were suitable for use with protein attractants. Details of baiting procedure and a recommended control programme are given. [See also abstract 1988.]

2760. Dean, H. A.
Quadrant distribution of mites on leaves of Texas grapefruit.
J. econ. Ent., 1959, **52**: 725-7, bibl. 4.

Variations in the distribution of *Eutetranychus banksi*, *Phyllocoptruta oleivora* and *Brevipalpus* spp.

2761. Stofberg, F. J.
Control of mite on citrus.
Fmg S. Afr., 1959, **35**(9): 33-5.

The life-cycle, damage and control of the red mite (*Panonychus citri*) using oil sprays and systemic insecticides are discussed, and notes, including control measures, are provided on the bud mite (*Aceria sheldoni*), silver mite (*Hemitarsonemus latus*), rust mite (*Phyllocoptruta oleivora*), and the grey mite (*Calacarus citrifolii*). Where more than one mite is present control recommendations are: (1) red and grey mites, 1½ lb. Kelthane; (2) grey and rust mites, ¾–1½ lb. zineb; (3) bud and grey mites, 1 lb. chlorobenzilate; (4) red and bud mites, 1–1½ gal. oil plus ½ lb. chlorobenzilate; (5) rust and red mites, 1–1½ gal. oil plus ½ lb. zineb *or* as in (4); all quantities in 100 gal. water.

2762. Tucumán, Estación Experimental Agrícola.
El tostado de la fruta cítrica. (**Rust mites of citrus fruits.**)
Circ. Estac. exp. agríc. Tucumán **157**, 1958, pp. 3, illus.

Treatments against *Phyllocoptruta oleivora* include lime-sulphur, wettable sulphur, zineb, maneb, chlorobenzilate, ziram, and barium polysulphide.

2763. Riehl, L. A., LaDue, J. P., and Rodriguez, J. L., Jr.
Efficiency of ethion in oil spray against California red scale and citrus red mite.
J. econ. Ent., 1959, **52**: 857-60, bibl. 12.

Laboratory tests have shown ethion in kerosene to be very effective against eggs of non-resistant strains of citrus red mite (*Panonychus citri*), but the dosage had to be increased more than 15-fold to obtain similar results on eggs of resistant strains. Malathion in kerosene was more lethal to California red scale (*Aonidiella aurantii*) than ethion, but it was comparable with ethion when applied in medium grade spray oil, and both compounds counteracted the relative ineffectiveness of spray oil against increased scale density. Deposits of both materials in spray oil effectively prevented the settlement of newly born scales, and in this medium they were toxic to mite eggs resistant to organic phosphate insecticides. The effectiveness of a given dosage of ethion against adult female scales was directly proportional to the concentration of kerosene in an aqueous spray. [For earlier work see *H.A.*, 28: 4031.]—Univ. Calif., Riverside.

2764. Muma, M. H.
Natural control of Florida red scale on citrus in Florida by predators and parasites.
J. econ. Ent., 1959, **52**: 577-86, bibl. 20.

Earlier observations had shown that Florida red scale (*Chrysomphalus aonidum*) on citrus was adequately controlled by biological factors. Among these, parasitic fungi and predators did not appear to play an important rôle. High rates of scale mortality were found, however, to result from insect parasitism, and evaluation studies have demonstrated a decided negative relationship between parasite populations and rates of parasitism on the one hand and intensity of scale infestations on the other. Studies on parasite incidence and abundance, the effects of parasitism on scale infestations and on factors influencing parasite efficiency have indicated that *Pseudhomalopoda prima*, the parasite attacking mature female scales, is the critical parasite species. The most important supporting species appeared to be *Aspidiotiphagus lounsburyi* and *Prospaltella aurantii*, which attack male and second stage female scales.—Univ. Fla Citrus Exp. Sta., Lake Alfred.

2765. Clancy, D. W., and Muma, M. H.
Purple scale parasite found in Florida.
J. econ. Ent., 1959, **52**: 1025-6, bibl. 3.

Aphytis lepidosaphes [see also *H.A.*, 29: 2918a].

2766. Hely, P. C., and Duncan, J. H.
Soft brown scale, *Coccus hesperidum* L.
Agric. Gaz. N.S.W., 1959, **70**: 537-40, bibl. 3, illus.

The life history is described. The presence of ants increased infestation of 3-year-old grapefruit trees, but these were controlled for 2-month periods by spraying the base of the tree with 0·5% dieldrin. Single sprays of white oil 1 : 80 + malathion w.p. 0·1% or white oil 1 : 80 + malathion w.p. 0·05% + parathion w.p. 0·025% gave at least as satisfactory control as did single sprays of white oil 1 : 40 or double sprays of white oil 1 : 80 spaced a few days apart.

2767. Riehl, L. A., and Wedding, R. T.
Effects of naphthenic and paraffinic petroleum composition at a comparable molecular weight or viscosity on photosynthesis of Eureka lemon leaves.
J. econ. Ent., 1959, **52**: 883-4, bibl. 4.

e procedure in these experiments was the same that described in an earlier report [see *H.A.*, : 2876]. At a deposit level comparable with at of a practical field dosage, no effects on photo- nthesis were evident for the difference in para- nicity at a molecular weight of 306 to 308 or a scosity of 70. In the high range of oil deposit, dicative of the situation in oil-soaked tissue, tial inhibition of photosynthesis was about the me, but recovery was faster for plants treated th the naphthenic oil than for those treated with paraffinic oil of comparable molecular weight viscosity. The difference in rate of recovery sociated with the difference in paraffinicity was eater for oils of comparable viscosity than for ose of comparable molecular weight. [From thors' abstract; for similar work on transpiration ects, see *H.A.*, 29: 3984.]—Univ. Calif., River- e.

58. BLINN, R. C., AND OTHERS.
Locale of aged Tedion residues on citrus fruits.
J. econ. Ent., 1959, **52**: 723-4, bibl. 8.

out 90% of the Tedion residue on oranges was ated in the waxy cuticle of the peel and about % concentrated in a soft colourless fraction nprising only 2% of the wax. Normal com- rcial washing of lemons was found to remove out 60% of the residual Tedion.—Univ. Calif., verside.

Citrus—fruit handling and storage.

(*See also* 2768.)

59. SMITH, R. J., AND PERRY, R. L.
New method for handling citrus fruits from orchard to packing house uses simple equipment.
Calif. Agric., 1960, **14**(1): 5-6, illus.

tractor, with a boom hoist, pulling a trailer ded with lightweight, cylindrical fibre bins can handled by 1 man who drives the tractor and rates the hoist from a platform at the rear of tractor. Each bin holds just over 200 lb. of t, and tests showed that 1 man can load 5 tons ruit in 25–40 min. (50–80 tons/day). [See also 4., 29: 3986 and 30: 1182.]

0. GRIERSON, W., AND HAYWARD, F. W.
"Dowicooling."
Mimeo Rep. Fla Citrus Exp. Stat. **60-10**, 1959, pp. 3.

ails of equipment, materials, procedure and ording when using Dowicide A in the hydro- ler water.

1. LONG, J. K., AND LEGGO, D.
Waxing citrus fruits.
Food Pres. Quart., 1959, **19**: 32-7, bibl. 3, illus., reprinted in *Agric. Gaz. N.S.W.*, 1959, **70**: 399-405.

Slab waxing though simple is not considered satisfactory. Solvent waxing is widely used in Australia, whereas the hot fog spray method is not, although it gives excellent results when carried out correctly. Applying a water-wax emulsion by dipping is the commonest method in Australia and has proved efficient and economical, although the more recently developed foam waxing is gaining ground. Instructions for operating the two last-names plants are given. These recommendations are the result of investigations made at the Citrus Wastage Research Laboratory, Gosford.

2772. HOPKINS, E. F., AND McCORNACK, A. A.
Methods for the control of decay in oranges.
Citrus Mag., 1959, **22**(4): 8, 10-11, 26, 30-1, bibl. 16.

Data accumulated over 7 seasons on the control of stem end rots and blue and green moulds by chemicals and improved methods of post-harvest handling are tabulated and discussed. Diphenyl impregnated pads at the top and bottom of each case, or combinations of diphenyl pads with Dowicide A-Hexamine and pyrrolodine dips gave the best control of decay with fruit held at 60° F. or at 70° F. Waxing with a fungicidal wax, PF-1, in addition to diphenyl treatment was also very successful. Cool storage, curing, de-greening under carefully regulated humidity and air flow conditions, and prompt handling also reduced decay. [See also *H.A.*, 28: 800.]—Fla Citrus Exp. Stat. and Citrus Commission.

2773. ANON.
Recommendations for control of decay in fresh citrus fruit.
[*Publ.*] *Fla Citrus Commiss.*, 1959, pp. 4.

Using diphenyl impregnated pads, or Dowicide A-Hexamine dips or waxes.

2774. ORIHUEL GASQUE, B., MERÍ PUIG, J., AND MORAGUES TARRASÓ, J.
El uso de los derivados del boro en la lucha contra el podrido de la naranja. I. Efecto del hidróxido sódico, de la temperatura y del jabón frente al podrido por *Penicillium*. **(The use of boron derivatives for the control of mould on oranges. I. Effects of sodium hydroxide, temperature and soap on *Penicillium* moulds.)** [English summary ½ p.]
An Edafol. Fisiol. veg., 1959, **18**: 289-320. bibl. 33, illus.

In a preliminary investigation on the control of green mould (*Penicillium digitatum*) and blue mould (*P. italicum*) on Washington Navel oranges sodium hydroxide had only slight fungicidal and fungistatic effects and injured the fruit, especially at the higher rate tested (2%) and the higher temperature (43–46° C.). Mould was significantly less after 3 days' exposure to a high temperature (46–49° C.) than after similar exposure to a low temperature (15° C.). Soya potash soap had no effect.——Inst. Laboral de Gandía.

2775. Polacek, K.
Report to the Government of Cyprus on the fumigation of citrus fruit and other foodstuffs.
Rep. FAO/ETAP **978**, Rome, 1958, pp. 10.

Recommendations for ethylene dibromide treatment against Mediterranean fruit fly.

Litchis.

2776. Singh, K. K., and Sarin, P. L.
Studies on the varietal differences in fruit quality in litchi (*Litchi chinensis* Sonn.).
Indian J. Hort., 1957, **14**: 103-7, bibl. 5, [received 1959].

Fruits of 5 commonly grown varieties were analysed to determine ascorbic acid contents, total soluble solids, percentage of sugars and acidity. The variety Panjore Common is recommended for commercial cultivation in the Punjab.—Govt. Fruit Pres. Lab., Patiala, Punjab.

2777. Singh, R.
Improvement of packing and storage of litchi at room temperature.
Indian J. Hort., 1957, **14**: 205-12, bibl. 3, [received 1959].

Fruits dipped in 0·5% copper sulphate solution for 3 min. and then packed in perforated polythene bags retained good colour and appearance for 6 days.—Govt Fruit Res. Stat., Saharanpur.

Macadamias.

2778. Dedolph, R. R., and Hamilton, R. A.
The bitterness problem in some seedling macadamias.
Hawaii Fm Sci., 1959, **8**: 7-8.

Nuts containing a cyanogenetic glucoside were found to be smaller in size and appeared to be restricted to a few seedling orchards. Grafting should overcome the problem. HCN contents in mg. per g. were 0·034–0·189 in sweet, 0·400–0·405 in slightly bitter, and 0·573–0·810 in unpalatable, nuts.

Olives.

(*See also* 1865.)

2779. Gratch, H.
Report to the Government of Cyprus on olive production.
Rep. FAO/ETAP **1006**, Rome, 1959, pp. 17.

The present olive industry is described. Recommendations include improvements in cultural practices and in oil production and packing, new plantings, and a programme of experimental work.

2780. Abcarius, E. F.
Rapport au gouvernement du Maroc sur les possibilités d'amélioration de la production oléicole. **(Report to the Moroccan Government on the prospects of improving olive production.)**
Rep. FAO/ETAP **943**, Rome, 1958, pp. 22, illus.

Recommendations cover irrigation, propagation, pruning, pest and disease control, and improved processing.

2781. de la Rocha G., G.
Propagación vegetativa del olivo, 1958. **(Vegetative propagation of olives, 1958.)**
Inf. mens. La Molina, 1959, **33**(378): 11-14.

With slight differences in the percentages of unions, the results were very similar to those for the previous year [see *H.A.*, 29: 1859 and 30: 1199].

2782. Bonnet, P.
Normas para el asiento directo de plantones de olivos injertados durante un año sobre porta-injertos de semillas. **(Rules for the direct planting of olive transplants less than a year after grafting on seedling rootstocks.)**
Bol. Oleic. int., 1959, **9**(50): 11-16.

Experience of replanting frost-damaged olive groves in France has shown that transplants can be used less than a year after grafting, provided certain rules are observed. The young plants should be fully ripened by late summer, and if a wet autumn prolongs growth they should not be moved until the end of the winter. Great care must be taken not to disturb the ball of soil dug up round the roots, and the packing straw must be dry, preferably treated with a fungicide, and arranged to allow ventilation of the hampers in which the plants are packed. Rapid transport and soaking of the roots on arrival are important. Hoeing and mulching are advantageous after planting.

2783. Riera, F. J.
Reconstrucción de los olivos afectados por las heladas del invierno de 1956. **(Reconstruction of olive trees damaged by the frost of the winter of 1956.)**
Bol. Oleic. int., 1959, **9**(48): 15-24.

The following treatments are recommended: binding the bark and painting cracks in branches to stimulate cambial activity; making transverse incisions as deep as the wood above healthy shoots; removing horizontal and drooping branches to encourage the drawing of sap by terminal and vertical shoots; thinning of new shoots in the following spring; and leaving replacement shoots at the bases of those main branches which may not heal satisfactorily.

2784. Baldini, E.
Contributo allo studio delle esigenze idriche dell'olivo—Indagini sugli effetti della specializzazione e della consociazione sulle disponibilità di acqua del terreno. **(A contribution to the study of the water requirements of olive trees. Investigations on the effects of clean cultivation and of cover cropping on the availability of water in the soil.)** [English summary ½ p.]
Stud. sassar., Sez. III, 1958, 1959, **6**: 94-123, bibl. 82, illus.

In trials over a 7-year period at Florence cover-cropping with cereals or lucerne considerably reduced olive yields by depleting soil moisture at the time of the trees' greatest requirement.

2785. Del Gaudio, S.
L'anulazione dell'olivo porta beneficio alla produzione? **(Does the ringing of olive trees increase production?)**
Reprinted from *Inform. agrar.*, 1957, No. 52, pp. 5, bibl. 6, illus.

Ringing, by single or double incision and by bark removal, was carried out shortly after fruit set. The number of mature fruits per branch was increased in the varieties Coratina and Frantoio, and decreased in Leccese, Cellina, Piangente and Paesana. Reviewing the results of these and earlier experiments [see *H.A.*, 25: 969] it is concluded that a decrease in fruit size due to ringing counteracts any increase in fruit number. The only definite instance of an increase in the weight of fruits from 1,000 flowers by ringing was in Cellina, which responded best to a double incision. Otherwise, whether carried out in April or in June, it had no significant beneficial effect on yield and was unfavourable for the variety Carotina.

2786. Zizbejova, Z. G.
The water regimes of some trees and shrubs in soils with different salt contents. [Azerbaidžan, with Russian summary 1½ pp.]
Tr. Inst. Bot. Akad. Nauk Azerb.SSR., 1959, **21**: 16-36, bibl. 24.

One-year-old wild olive, cultivated olive and fig trees were planted in soils with low, medium, and high salt contents, and the soils were further treated by applying 20 g. of sodium phosphate plus 30 kg. of manure or 20 g. of sodium phosphate plus 20 g. of sodium nitrate. The fig trees showed more intensive transpiration than the olives. Transpiration decreased with increasing salt content of the soil. Water deficits, which were greatest in August were higher in the figs than in the olives.

2787. Mesa Bernal, D., and Valenzuela Samper, G.
El cultivo del olivo. Plagas y enfermedades. **(Olive growing. Pests and diseases.)**
Agric. trop. Bogotá, 1959, **15**: 678-81.

In Mexico, Central and South America [for previous part see *H.A.*, 29: 2917z].

2788. Nicolini, C.
Estado de incubación de la tuberculosis del olivo. **(The incubation phase of olive tuberculosis.)**
Bol. Oleic. int., 1959, **9**(48): 7-13.

The incubation period for *Pseudomonas savastanoi*, artificially inoculated into young seedling Arbequina olive trees in Argentina, ranged from 14 to 637 days. Tumour formation was most common between September and March, and least common from April to July. The data will be applied in drawing up quarantine regulations.

2789. Salerno, M., and Romano, A.
Saggi sull'azione della streptomicina contro la rogna dell'olivo (*Ps. savastanoi* (Smith) Stevens), in prove in vitro, in serra e in campo. **(Attempted control of olive knot (*Pseudomonas savastanoi*) *in vitro*, in the glasshouse and in the field, with streptomycin.)** [English summary ½ p.]
Not. Mal. Piante, 1959, No. 49/50, pp. 243-58, bibl. 21, illus.

Although streptomycin applied at concentrations of 250, 500 and 1,000 p.p.m. of a commercial product containing streptomycin sulphate, corresponding to 110, 220 and 240 p.p.m. of pure antibiotic, showed appreciable action against *P. savastanoi* on agar plates, it had no effect, either under glass or in the field, when plants were sprayed 3 days before inoculation with the pathogen or 3 days after inoculation. A comparable trial with zineb (0·3%) also gave negative results, whereas bordeaux mixture was successful.—Ist. Pat. veg., Univ. Catania.

2790. Russo, G.
Reperti bio-ecologici sul *Dacus oleae* ed esperimenti di lotta antidacica in Ascea (Salerno)—1957. **(Bio-ecological observations on *Dacus oleae* and control experiments in Ascea (Salerno)—1957.)**
Tecn. agric., 1959, **11**: 121-4.

See *H.A.*, 30: 1203.

2791. Vallee, F.
Estudio sobre las variaciones de la composición química de la pulpa de la aceituna durante el proceso de maduración, realizado por F. G. Sandret de la Escuela Nacional de Agricultura de Mequínez. **(A study of variations in the chemical composition of olive pulp during the ripening process, carried out by F. G. Sandret of the Mequínez National College of Agriculture.)**
Bol. Oleic. int., 1959, **9**(50): 17-28.

Changes in the physical characteristics and in the content of soluble sugars, mannitol, celluloses, hemi-celluloses and N compounds are reported.

2792. Shasha, B., and Leibowitz, J.
Oleuropeic acid: a new compound from *Olea europaea*.
Nature, 1959, **184**: 2019-20, bibl. 1.
On the oleoropein from *Olea europaea*.
Bull. Res. Coun. Israel, Sect. A, 1959, **A8**: 92, bibl. 1.

Structure and behaviour.

2793. Blasi, F.
Influencia del recubrimiento interior de los bidones metálicos sobre las características de los aceites almacenados en ellos. **(The effect of the lining of metal cans on the characteristics of oils stored in them.)**
Bol. Oleic. int., 1959, **9**(51): 9-15.

Certain lining substances such as chlorinated rubber and some phenol derivatives imparted unpleasant flavours to olive oil. Various plastic coatings applied inside the cans had less effect than the bare metal on the oil, but more effect than glass vessels. The best results with cans were given by applying 3 layers of Epicote as a lining and sealing with Vitroval.

2794. FAO.
Olive oil.
FAO Commod. Rep. Fats and Oils **8**, 1959, pp. 34.

Supplies and trade for 1958; the 1959 world output is estimated at 1·1 m. tons.

Passion fruit.

2795. Pruthi, J. S.
Physico-chemical composition of passion fruit —*Passiflora edulis* Sims.). II. Varietal differences.
Indian J. Hort., 1958, **15**: 87-93, bibl. 9, illus.

Juice analyses showed that the yellow variety was generally inferior to the purple in juice content, percentage Brix, ascorbic acid, sugars and flavour, but was richer in total acid and carotene. [For part I, see *H.A.*, 29: 2918d.]—Centr. Food Tech. Res. Inst., Mysore.

Persimmons.

2796. Morettini, A.
La Fugi, cultivar di kaki poco nota. **(Fugi, a little-known variety of persimmon.)**
Riv. Ortoflorofruttic. ital., 1959, **43**: 377-80, bibl. 6, illus.

An early variety with fruit of high quality and almost immune from attack by the fruit fly *Ceratitis capitata*.

2797. Montenegro, H. W. S., and Salibe, A. A.
Vitamina C em caqui (*Diospyros kaki* L.). **(Vitamin C in persimmons.)** [English summary 11 lines.]
Rev. Agric. Piracicaba, 1959, **34**: 185-95, bibl. 10.

Rather low vitamin C contents were found in the 10 varieties of persimmon examined, the range being 0·02–4·59 mg. per 100 g. The values were higher in unripe than in ripe fruits, but the decrease could be largely prevented by treating the unripe fruits with a 6·7% solution of acetic acid to accelerate ripening. The vitamin C content showed no correlation with either Brix or the number of seeds per fruit.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

2798. Maclet, J.-N., and Barrau, J.
Catalogue des plantes utiles aujourd'hui présentes en Polynésie française. **(Catalogue of useful plants now growing in French Polynesia.)**
J. Agric. trop. Bot. appl., 1959, **6**: 1-29, 161-84, bibl. 40.

Besides vegetables, fruits, and stimulants (tea, coffee, cacao, *Cola*, *Piper methysticum* and tobacco) the list includes plants yielding condiments, spices, essential oils, latex, gums, resins, tannin, dyes, drugs, fish poisons, timber, cane, and fibres; also shade trees and living supports, cover crops, anti-erosion crops and (economically important in these areas) plants yielding flowers or seeds used in ornamental necklets and garlands.

2799. Barrau, J.
The sago palms and other food plants of marsh dwellers in the South Pacific islands.
Econ. Bot., 1959, **13**: 151-62, bibl. 13, illus.

The botany of *Metroxylon* spp. yielding sago is described, together with native methods of extraction. Figures are given for sago composition. Species of *Cyrtosperma* (aroids with edible tubers) and the mangrove *Bruguiera* with edible fruits are also described.

2800. Pal, B. P. (Chairman).
Proceedings of the international symposium on origin, cytogenetics and breeding of tropical fruits.
Indian J. Hort., 1958, **15**: 101-287, bibls, illus.

Numbers 3 and 4 of Vol. 15 are entirely concerned with papers given at the international symposium by delegates from Japan, the U.S.A., India, Ceylon and England. The following articles are included: The origin and dispersal of citrus fruits, having their centre of origin in India, by T. Tanaka (bibl. 58); The origin, spread and improvement of the avocado, sapodilla and papaya, by C. A. Schroeder (bibl. 20); The origin of mango, by S. K. Mukherjee (bibl. 20); The origin and evolution of cultivated bananas, by S. Krishnamurthi and V. S. Seshadri (bibl. 30); Origin and history of citrus fruits of Assam, by S. Dutta (bibl. 24); Citrus fruits of hybrid origin in Ceylon, by A. V. Richards (bibl. 5); Problems in crop improvement in mango, by K. C. Naik, C. B. Rao, and V. S. Raman (bibl. 17); Variability in the mango and its significance to the production of new varieties, by L. B. Singh and R. N. Singh (bibl. 17); Breeding new mango varieties in South India, by C. B. Rao and V. S. Rangacharlu; The history, objectives and present status of citrus breeding in the United States, by C. A. Schroeder (bibl. 3); Breeding problems in Japanese citriculture, by T. Tanaka (bibl. 12); Fruit improvement work in the Punjab, by K. K. Singh (bibl. 12); Improvement of fruits in Madhya Pradesh with special reference to citrus and mango, by P. S. Parsai (bibl. 16); Problems and techniques in breeding new varieties of bananas, by K. S. Dodds (bibl. 12); Genetic variability and the scope for improvement of the banana in India, by T. G. Nayar (bibl. 23); Varietal diversity and improvement of grapes, by G. S. Randhawa and J. P. Singh (bibl. 27); Studies on genetic variability in *Annona squamosa* L., by L. Venkataratnam and G. Satyanarayanaswamy (bibl. 33); Cytogenetics and the breeding of fruit trees, by K. S. Dodds (bibl. 21); Incompatibility systems in relation to fruit breeding, by K. S. Dodds (bibl. 11); Induction of mutations in fruit trees—problems and techniques, by M. S. Swaminathan (bibl. 10); Induced polyploidy in relation to the breeding of new varieties of fruit trees with special reference to *Carica papaya* Linn., by R. N. Singh (bibl. 24); Some aspects of fruit tissue culture as related to developmental morphology, by C. A. Schroeder (bibl. 16); Polyembryony and *in vitro* culture of embryos of *Citrus* and *Mangifera*, by P. Maheshwari and N. S. R. Swamy (bibl. 46); The citrus die-back problem in relation to cultivation of citrus fruits in India, by R. D. Asana (bibl. 7).

Areca palms.

2801. Raghavan, V., and Baruah, H. K.

Arecanut: India's popular masticatory—history, chemistry and utilization.

Econ. Bot., 1958, **12**: 315-45, bibl. 157, illus.

The scope of this detailed review extends beyond the fields indicated in its title. Biology, agronomy, diseases and pests and methods of processing are all covered. The industry has made considerable progress in recent years, but much research work remains to be done to produce better varieties of arecanut and to develop its culture on a plantation scale. Lines of work that should be followed are outlined.

2802. Raghavan, V., and Baruah, H. K.

Effect of the time factor on the stimulation of pollen germination and pollen tube growth by certain auxins, vitamins, and trace elements.

Physiol. Plant., 1959, **12**: 441-51, bibl. 9.

Experiments on the stimulation of pollen grains of *Areca catechu* by certain auxins, vitamins and trace elements [see *H.A.*, 27: 3992] have been extended to studies on the effects of the time factor on the rate of germination of pollen grains and the rate of pollen tube growth. The addition of IAA, IBA, H_3BO_3, $MnSO_4$, $(NH_4)_2MoO_4$, $ZnSO_4$ and $AuCl_3$ in non-lethal concentrations to a basal medium of sucrose increased germination of pollen grains and growth of pollen tubes within the first hour; the subsequent growth rate and total length of tubes were also increased. The vitamins PABA, AA and inositol, on the other hand, in non-lethal doses, had no effect on germination in the initial phase, acceleration being entirely confined to the second phase (3–12 hours after sowing). With IPA there was an initial period of inhibition. With all the substances tested lethal concentrations caused growth inhibition within 2–3 hours. It is suggested that growth substances penetrate the pollen grains and have a stimulating effect until an equilibrium concentration is reached, but that further penetration inhibits growth and damages the pollen tubes.—Gauhati Univ., Assam.

2803. Baruah, H. K., and Raghavan, V.

On the factors influencing fruitset and sterility in arecanut (*Areca catechu* Linn.) III. On the possible influence of airspora on the normal course of pollination and fertilization.

Mycopath. Mycol. appl., 1959, **10**: 341-9, from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 5,473.

Numerous air-borne fungal spores were found adhering to the stigmas; furthermore, fungal and bacterial metabolites were found to inhibit pollen germination and reduce the rate of growth of pollen tubes *in vitro*. This is considered to be a possible cause of sterility, which results in nearly 55% loss of fruit in Assam. [For part II see *H.A.*, 27: 3992.]—Gauhati Univ., Assam.

Bananas.

(*See also* 1535, 2701, 2800, 3075.)

2804. Philippe, J.

La culture bananière en Guinée, en Côte d'Ivoire et au Cameroun. (**Banana growing in Guinea, the Ivory Coast and Cameroun.**) [Flemish summary 5½ pp.]

Bull. agric. Congo belge, 1959, **50**: 957-1004, bibl. 21, illus.

A full account of ecology, culture, yields and transport.

2805. Jamaica.
Annual Report of the Banana Board Research Department, Jamaica, for 1957-1958, 1959, pp. 44, bibl. 15.

Crop physiology: Experiments on openhandedness indicated that root pruning had no effect on its incidence, that it was less prevalent where all the N fertilizer was applied before shooting and that the source of the suckers was of no significance. The results of studies on the effects of nutrients on the development of premature yellowing clearly indicated that it was reduced by K and increased by N fertilization. *Soil chemistry:* A condition of poor growth and blackened roots was found to be due to infestation by the nematode *Radopholus similis* and to be favoured by a high water table. Fruit analyses showed that excessive bruising in transit was not related to K deficiency. *Agronomy:* Humber fish manure was no more effective than sulphate of ammonia as a source of N, and urea was fully as good as the latter. Significant responses to P and K were observed. The effect of defoliation on fruiting was studied. Sucker timing observations at various altitudes showed that there was an increase of 0·36 months per 100 ft. increase in altitude in the time taken for plants to shoot. Counts of hands and measurements of height at shooting and of average girth indicated that the taller and more robust plants gave the higher grading (number of hands). A fall of 6° F. in mean temperature was found to lengthen the time taken for fruit to mature by 23 days. *Plant pathology.* A number of new oil sprays, all giving excellent control of leaf spot (*Mycosphaerella musicola*) were screened for phytotoxicity. Adequate control of this disease was obtained by mist spraying at a rate of 4 gal. per acre with forms of cuprous oxide and copper oxychloride. Soil surface applications of dieldrin again gave good control of borer (*Cosmopolites sordidus*). Blackhead toppling disease, caused by the nematode *Radopholus similis*, was reduced by the use of parathion and Nemagon, the latter being non-phytotoxic in its granular form. The triploid varieties appeared to be more susceptible to this nematode than some of the newer tetraploid strains.

2806. Nayar, T. G., Seshadri, V. S., and Appaiyan, M. C.
Banana research in Madras, (a review).
Indian J. agric. Sci., 1958, **28**: 249-55, bibl. 8.

Including a list of 56 local varieties.

2807. Nayar, T. G., Sundararaj, J. S., and Seshadri, V. S.
Nendran banana—its culture and taxonomical status.
Indian J. Hort., 1957, **14**: 69-76, bibl. 6, [received 1959].

A large cooking variety.

2808. Simmonds, N. W.
Experiments on the germination of banana seeds.
Trop. Agriculture Trin., 1959, **36**: 259-73, bibl. 11, illus.

An account is given of investigations on the germination and early seedling growth of *Musa balbisiana* and of the techniques adopted for germination trials in the greenhouse and for storing seed of this species. The seed ecology of *M. balbisiana* and *M. acuminata* is also described. [See also *H.A.*, 23: 2229.]—I.C.T.A., Trinidad.

2809. Cox, E. A., Stotzky, G., and Goos, R. D.
***In vitro* culture of *Musa balbisiana* Colla embryos.**
Nature, 1960, **185**: 403-4, bibl. 4, illus.

Details of aseptic culture in Randolph and Cox medium containing 0·5% agar and 4% sucrose.—United Fruit Co., Norwood, Mass.

2810. Bhan, K. C., and Majumdar, P. K.
Propagation trials on banana. I. Effect of size of suckers and heading back on growth, maturity, yield and grade of fruit.
Indian J. agric. Sci., 1958, **28**: 141-8, bibl. 6, illus.

Suckers 3 ft., 4 ft. and 5 ft. tall were planted either with the leaves pruned only or headed back 1 or 2 ft. Suckers of each height made equally good growth, but 5-ft. suckers matured fruit earliest. Heading back caused only a temporary check in growth, but it delayed fruit maturation in 5-ft. suckers headed back 2 ft. Yield and number of hands per bunch were not related to height or heading back. It is concluded that, where transport is a problem, smaller suckers may be used.—Banana Res. Scheme, Chinsura, W. Bengal.

2811. Barker, W. G.
A system of maximum multiplication of the banana plant.
Trop. Agriculture Trin., 1959, **36**: 275-84, bibl. 7, illus.

The method requires the digging and planting of all suckers when they have attained a trimmed weight of more than 1·5 lb. and reached a height of 2–3 ft. In conjunction with this, the older leaf sheaths are stripped from the pseudostem, exposing the basally associated buds. These are covered with soil and left to develop. When a 2-week routine of sucker removal and bud exposure is followed, approximately 20 plants can be obtained from the parent before the supply of lateral shoots is exhausted. Satisfactory germination and growth will be obtained provided water is supplied as needed and the nutritional requirements of the plants are met. The method has been used successfully in the field in Central America. [From author's summary.]—Tela Railroad Co., La Lima, Honduras.

2812. Wright, J. O.
A note on pruning of bananas with 2,4-dichlorophenoxyacetic acid.
Trop. Agriculture Trin., 1959, **36**: 285, bibl. 2.

In trials over a period of 30 months unwanted suckers were pruned successfully by applying 5 c.c. of a 2% solution of the Na salt of 2,4-D in the small cavity formed by the base of the petiole or in the centre of the rolled-up spear. In a replicated trial plots thus pruned gave slightly higher yields than normally pruned plots.—Pamol Ltd., Nigeria.

2813. Nayar, T. G., Sundararaj, J. S., and Bakthavathsalu, C. M.
Preliminary studies on banana fruit development.
Indian J. agric. Sci., 1958, **28**: 381-99, bibl. 4, illus.

Weekly measurements were made of length, girth, volume and weight of Poovan and Monthan bananas from August to December. The data obtained indicate possible affinities with *M. acuminata* and *M. balbisiana* respectively. They also suggest that these varieties should not be harvested earlier than 15 weeks from the date of emergence.—Banana Res. Scheme, Aduthurai.

2814. Nayar, T. G., Seshadri, V. S., and Bakthavathsalu, C. M.
Abnormalities in bananas—III.
Indian J. agric. Sci., 1958, **28**: 401-2, bibl. 5.

Cases of multiple inflorescence, premature emergence of inflorescence, and reversion of fruit characters described. [For part II, see *H.A.*, 25: 3370i.]

2815. N.S.W. Department of Agriculture.
Banana pest and disease control programme 1959/60.
Banana Bull., 1959, **22**(10): 12.

Covering leaf spot and speckle, rust thrips, beetle borer and red spider.

2816. (Blake, C. D.)
Use of copper in oil not now necessary in leaf spot control.
Banana Bull., 1959, **22**(9): 6.

For cercospora control 1½–2 gal. per acre of a misting oil at 3-week intervals from early January to the end of May is adequate in Australia.

2817. Bradbury, R.
Helicopters over the Caribbean.
Commonw. call., May 1959, p. 9, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**, Abstr. 1,555.

Spraying against banana leaf spot disease in Jamaica is effected by helicopters equipped with 2 tanks of 20-gal. capacity and a 30-ft. spray boom having 34 nozzles. Flying 8 ft. above the plants at a speed of 40 knots the effective swath width is 60 ft., the application rate 1 gal./acre, the droplet size about 70 μ and the output 100–150 acres/hr.

2818. Gallego M., F. L.
Gusano Limacodidae del plátano y otras plantas. **(A caterpillar of the family Limacodidae as a pest of bananas and other plants.)**
Rev. Fac. nac. Agron. Medellín, 1959, **19**(53): 63-8, illus.

The larvae of the moth *Sivine nesea* attack banana plants for preference, but are also a pest of avocadoes, mangoes and sometimes pasture grasses. Fairly good control has been achieved with toxaphene and other unspecified insecticides. Possible endoparasites for biological control are mentioned.

2819. Blake, J. R., and Stevenson, C. D.
Effects of growth regulating substances on the ripening of detached banana fruits.
Qd J. agric. Sci., 1956, **16**: 87-90, bibl. 6.

Mature but unripe Cavendish bananas were treated with 14 growth substances, generally by dipping, and held at 68° F. or at room temperature. Some substances, notably 2,4-D and MCPA and their salts at 200–400 p.p.m., markedly accelerated ripening, but the effect was uneven and the skins remained a blotchy, greenish-yellow colour. Esters of 2,4-D and 2,4,5-T caused severe skin damage even at 200–400 p.p.m. Two compounds, 2,4-dichlorophenol and chloroisopropylphenylcarbamate appeared consistently to retard ripening.

Cacao.

(*See also* 3039, 3054, 3055.)

2820. Torto, J. O.
History of cocoa in Ghana.
Ghana Fmr, 1959, **3**: 88-90, 105-8.

Including present production methods.

2821. Wood, G. A. R.
Cocoa-growing in Venezuela, Colombia and Ecuador.
[*Publ.*] *Cadbury Bros.*, Bournville, 1959, pp. 57, bibls, illus.

With notes on the diseases ceratostomella wilt, cushion gall and monilia pod rot.

2822. de Almeida, C. R. M., and de Matos Moraes, A.
A evolução das produções de cacau nas ilhas de S. Tomé e Príncipe. Estudo comparativo com outras regiões produtoras do globo. **(Trends in cacao production in the islands of São Tomé and Príncipe. A comparison with other regions of production in the world.)**
Agros, 1959, **42**: 401-8, bibl. 7.

2823. U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
Larger world cocoa crop expected for 1959-60.
Foreign Agric. Circ. U.S. Dep. Agric. **FCB 2-59**, 1959, pp. 19.

Estimated at 2,075 m. lb., 5·3% above 1958–59 production.

2824. TRINIDAD AND TOBAGO.
Administration Report of the Affairs of the Cocoa Board for the year 1957, 1959, pp. 42, 60 c.

Progress of research work reported includes the following: *Breeding and selection:* Of high-yielding witches' broom-resistant clones and of seedling populations produced by crossing Amazon clones with Trinitario or other Amazon clones. *Field experiments:* Fertilizer trials; shade and fertilizer trial; spraying trials with Perenox. *Propagation:* Mechanical mixing of soil; use of smaller cuttings; gibberellin tested but without significant results. *Shade trees:* No introduced *Erythrina* sp. was as good as *E. indica*, but *Peltophorum dasyrachis* seems better than *P. ferrugineum*. *Cocoa processing:* Good results from trials of artificial drying using electricity as a source of heat.

2825. DE MEY, L.
Récents progrès dans l'amélioration du cacaoyer à Yangambi. (**Recent progress with cacao selection at Yangambi.**)
Bull. Inf. I.N.É.A.C., 1959, **8**: 207-17.

The principal results are presented of yield trials begun in 1951 with seedling and clonal material from 96 Forastero and hybrid mother trees. It is concluded that in commercial plantations annual yields of at least 1,000 kg. of marketable cacao per hectare can be expected.

2826. ALVIM, P. DE T.
Un procedimiento simple para conservar el poder germinativo de las semillas de cacao. (**A simple procedure for maintaining the viability of cacao seeds.**)
Agronomía [*Lima*], 1958, **25**(92): 43-8, from *Supl. bibl. Turrialba*, 1959, **9**, Abstr. 50/59.

Recommendations based on experiments in Colombia, Ecuador and Costa Rica are as follows: The seeds should be mixed with lime to prevent fermentation during transport. The pulp should be removed, and the seeds, after rapid washing and immersion for 2 minutes in 1% Phygon-XL, should be dried in the shade for 1–2 hours and placed in polythene bags at the rate of 1–2 kg. per bag.—IICA, Zona Andina, Lima, Perú.

2827. ALLISON, H. W. S., AND CUNNINGHAM, R. K.
Preparing land for cacao in Ghana. Land clearance for field experimentation.
World Crops, 1959, **11**: 311-12, bibl. 1, illus.

On an area of uniform jungle the timber was felled and removed, the stumps being left *in situ*. Temporary and permanent shade of tree cassava and *Terminalia ivorensis* was planted at 10 × 10 ft. and 20 × 20 ft., respectively, ahead of the cacao. Costings are given.—W.A.C.R.I., Tafo.

2828. HARDY, F.
La relación carbono:nitrógeno en los suelos de cacao. (**The carbon/nitrogen ratio in cacao soils.**) [English summary ½ p.]
Turrialba, 1959, **9**: 4-11, bibl. 6.

Higher C/N ratios were found in Trinidad in sandy than in clayey soils, and cacao yields were positively correlated with these ratios. Factors tending to reduce the C/N ratio were: the accumulation of N from fallen leaves of leguminous shade trees; declining quantities of cacao leaf litter associated with continuous cropping without manuring; and loss of organic matter by soil erosion.

2829. SCHROO, H.
Acute zinc deficiency observed in cacao on certain soil types in Netherlands New Guinea.
Neth. J. agric. Sci., 1959, **7**: 309-16, bibl. 5, illus.

Affected trees exhibited long, narrow, spirally-twisted leaves with distorted vein pattern and interveinal chlorosis. In addition premature leaf-fall, die-back of terminal shoots and profuse shoot formation on the branches were observed. Spraying with 2·5 g. $ZnSO_4$ per tree every 10 days achieved recovery within 7 months.—Agric. Res. Stat., Manokwari.

2830. HUTCHINS, L. M.
Current surveys for cushion gall.
J. agric. Soc. Trin. Tob., 1959, **59**: 325-40, bibl. 8, being *Pap. 7th Inter-Amer. Cacao Conf.*, Palmira, 1958.

The symptoms of the disease are described, and data accumulated from current surveys in Central and South America and some Caribbean islands are summarized. The cause is unknown; there is a strong indication that the disease may become systemic in the tree and that one or more biological agents may be responsible for its spread. Until control can be formulated propagating material for new plantations should be selected from healthy trees. A new disorder has been found in the leaves of nursery and bearing trees in Costa Rica and other areas. The symptoms consist of chlorotic spots and streaks and a marked network of cleared veinlets in restricted areas of affected leaves, which may also suffer distortion. This disease is not related to cushion gall. It has been found in areas and trees not showing the latter disease, but cases have also been recorded in which both disorders have been found occurring in the same tree. The cause is not known but the symptoms suggest a virus.—Turrialba, Costa Rica.

2831. THRESH, J. M., AND TINSLEY, T. W.
The viruses of cacao.
Tech. Bull. W. Afr. Cocoa Res. Inst. 7, 1959, pp. 32, bibl. 3 pp., illus., 2s. 6d.

The symptoms, transmission and relationships of viruses from different countries and hosts are described for cacao necrosis, cacao mottle leaf and swollen shoot diseases.

2832. NAUNDORF, G.
Die Monilia-Krankheit bei *Theobroma cacao* L. mit besonderer Berücksichtigung der Übertragung durch Baumwanzen und ihre Bekämpfung. (**Monilia disease of cacao with particular reference to its spread by plant bugs and their control.**) [English and Spanish summaries 23 and 24 lines respectively.]
Gordian, 1959, **59**: 485-8, bibl. 19, 524-5, 564-6, illus.

Investigations have shown that in Colombia and Ecuador the plant bug *Mecistorhinus tripterus* is an important vector of the monilia disease of cacao. The pest is easily controlled by various insecticides, including DDT, BHC, dieldrin, aldrin and chlordane.

2833. HENAO C., R.
Represión de los insectos taladradores del tronco de cacao (*Theobroma cacao* L.). (**Control of trunk boring insects in cacao.**) [English summary ½ p.]
Acta agron. Palmira, 1958, **8**: 167-80, bibl. 17.

Trunk borers (*Xyleborus* spp.), which act as vectors of the blue rot fungus (*Ceratostomella fimbriata*), were effectively controlled by spraying the cacao trunks twice, with an interval of a month, with 0·25% BHC. Other insecticides giving good results were aldrin and dieldrin, also at 0·25%. Toxaphene and DDT at 1% were less effective.

2834. CACHAN, P., AND VINCENT, J.
L'étude et la lutte contre les parasites du cacaoyer au Ghana. (**Studies and control of cacao pests in Ghana.**)
Café, Cacao, Thé, 1959, **3**: 14-20, illus.

Capsids and mealy bugs.

2835. ENTWISTLE, P. F., JOHNSON, C. G., AND DUNN, E.
New pests of cocoa (*Theobroma cacao* L.) in Ghana following applications of insecticides.
Nature, 1959, **184**: 2040, bibl. 6.

Applications of dieldrin against ants have caused increases in numbers of *Eulophonotus myrmeleon*, a borer of trunk and branches, and of the larvae of an unidentified moth, which damage the bark and wood at branch junctions where they are protected by a web. Previously, increases in stem borers, *Tragocephala nobilis*, and pod-husk miners, *Marmara* sp., had been found to follow applications of BHC and dieldrin respectively [see *H.A.*, 29: 2932].—W.A.C.R.I., Tafo, Ghana.

2836. QUESNEL, V. C.
The anaerobic phase in cacao fermentation.
Chem. Ind. Lond., 1960, No. 4, pp. 101-2, bibl. 7.

The author re-examines the evidence for the existence of an anaerobic phase, which has recently been questioned [see *H.A.*, 30: 1238], and suggests that the original experimental work [see *H.A.*, 22: 1899], on which it was based, should be more firmly established.—Colon. microbiol. Res. Inst., Trinidad.

2837. HOLDEN, M.
Processing of raw cocoa. III. Enzymic aspects of cocoa fermentation.
J. Sci. Food Agric., 1959, **10**: 691-700, bibl. 25.

The changes in the levels of a number of oxidizing and carbohydrate-splitting enzymes of amelonado cotyledons during both large- and small-scale fermentations were determined on samples of beans taken after various periods of fermentation from the top and centre of heaps of different sizes. Inactivation of enzymes took place sooner in the top layer, where the temperature rise was more rapid, than at the centre. Enzyme levels started to diminish during the period when the beans were dying and continued until, after 3 days' fermentation, little or no activity was detectable. The results suggest that prolonging fermentation for several days after the beans are dead is neither necessary nor desirable. A germination inhibitor, which was found in the pulp and testa of beans, decreased in amount during ripening and disappeared during fermentation. [From author's summary. For part II, see *H.A.*, 29: 867.]—W.A.C.R.I., Tafo, Ghana.

2838. VYLE, L. R.
Chocolate flavour: its assessment and speculation as to its probable origin.
Trop. Agriculture Trin., 1959, **36**: 287-98, bibl. 49.

A review.

2839. POWELL, B. D., AND WOOD, G. A. R.
Storage, transport and shipment of cocoa. 1. Prevention of moulding in storage. 2. Protection during handling and shipment.
World Crops, 1959, **11**: 314-16, bibl. 2, and 367-8, both illus.

Cocoa will develop moulds and deteriorate if the moisture content of the whole bean exceeds 8%. This figure will be rapidly attained if the R.H. of the store exceeds 80%. Heating and air conditioning are discussed; both are expensive. The improvement and successful operation of an existing unsatisfactory store are described. Insulation and controllable ventilation were provided, and the store was fully opened from 7 a.m. to 4 p.m. when the outside R.H. was less than that inside the store. The store was then tightly closed to prevent its temperature from falling, thus maintaining a more even R.H. The second paper describes the use of polythene bag liners. Provided the moisture content of the beans is only 5–6% such liners prevent moulding. For storage in the tropics 300-gauge liners are needed, but when repacking for shipment 150-gauge polythene is sufficient. The use of liners also prevents much damage by rain, sea spray and sweating in the holds and cross infestation by insect pests.

2840. DESCHREIDER, A. R.
Antioxidant properties of extracts of the skins of cacao beans. [French ?]
Industr. aliment. agric., 1958, **75**, 759-65, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: ii-47.

Ethanol extracts of the skins of cacao beans contain substances that delay the development of rancidity in palm oil, the effect being especially marked in the presence of copper.

Cashews.

(*See also* 3046.)

2841. RAO, V. N. M.
Studies on the vegetative propagation of cashew (*Anacardium occidentale* L.). I. Air-layering by cincturing and etiolation of shoots.
Indian J. agric. Sci., 1958, **28**: 181-97, bibl. 21, illus.

The method consisted in removing a strip of bark $\frac{1}{8}$–$\frac{1}{4}$ in. wide and winding round the ring a strand of twine to prevent the exposed ends healing over. Air-layering with damp moss in a polythene wrap was then carried out as usual. Clonal progenies were obtained in about 12 weeks from one-year-old shoots and also from current year's shoots in flush, flower or fruit. Propagation could be initiated successfully in any month except June or July, but the best results were obtained from August to April, 100% success being obtained in November with one-year-old shoots. Rooted plants could be planted out immediately after separation from the parent in June or July, but a period of nursing was required at other seasons.—Cent. Cashewnut Res. Stat., Mangalore.

2842. RAO, V. N. M., AND RAO, I. K. S.
Studies on the vegetative propagation of cashew (*Anacardium occidentale* Linn.). IV. The nurse-grafted Y-cutting method.
Indian J. agric. Sci., 1958, **28**: 575-82, bibl. 5, illus.

This method, originally devised for citrus, was found applicable to cashews and was most successful when carried out between February and May. The method is a combination of air-layering and inarching. One limb of a Y-shaped shoot of the tree chosen as the scion is inarched to a cashew seedling packed in Alkathene [polythene] film. Below the graft the scion is air-layered and, when roots have formed, removed and potted, still attached to the seedling. The two are then placed in a humid, bottom-heated propagating pit and can later be separated, thus producing 2 independent plants one on its own roots and the other on a rootstock.—Cent. Cashewnut Res. Stat., Mangalore.

2843. NAYAR, T. G., AND JOHN, J. P.
Cashew grafts and layers excel seedlings.
Indian J. agric. Sci., 1958, **28**: 129-32, illus.

One-year-old grafts, layers and seedlings were planted out and compared 2½ years later. The grafts showed the greatest average height, girth and spread, and all had fruited, the average yield being 33 nuts. The layers also made better growth and flowered and fruited earlier (13 nuts per tree) than the seedlings which had not fruited at all. Brief notes are given on inarching and air-layering.

2844. ABRAHAM, E. V.
Pests of cashew (*Anacardium occidentale*) in South India.
Indian J. agric. Sci., 1958, **28**: 531-43, bibl. 11, illus.

A 0·1% BHC spray and syringing are recommended for use against the borer *Plocaederus ferrugineus*, 0·05% BHC or 0·025% parathion against thrips, *Selenothrips rubrocinctus* and *Rhipiphorothrips cruentatus*, 0·025% parathion against leaf miner, *Acrocercops syngramma*, and mealy bug, *Ferrisiana virgata*, and 0·1% DDT against the tea mosquito, *Helopeltis antonii.*

2845. VENTURA, M. M., AND HOLLANDA LIMA, I.
Estudo cromatográfico quantitativo dos glicídios solúveis no curso da maturação do cajú (hipocarpo de *Anacardium occidentale* L.). **(Quantitative chromatographic study of the soluble sugars of cashew fruit during maturation.)** [English summary 6 lines.]
Portugal. Acta biol., Ser. A, 1958, **5**: 297-304, bibl. 7, illus.

Glucose, fructose and sucrose were the only soluble sugars identified in juice from the fleshy peduncle. The content of each increased considerably during maturation.—Lab. Bioquím., Univ. Ceará, Brazil.

Coconuts.

(*See also* 2925, 3039, 3040, 3046.)

2846. CEYLON.
Annual Report of the Coconut Research Board of the Coconut Research Institute for 1957, being *Sess. Pap.* **8**, Colombo, 1959, pp. 79, Rs. 2 + 35 cts postage.

Soil chemistry: Yield responses to K and P were observed in several manurial experiments. P also enhanced flowering in young plants. *Technological chemistry:* Studies of toddy fermentation and vinegar production. *Plant chemistry:* Analyses of apical buds and leaves; studies on *Phaseolus aureus* as an indicator of nutrient uptake. *Botany:* Tall × dwarf hybrids are vigorous, early flowering and high yielding. Crosses using King coconuts are less satisfactory. A satisfactory method of storing coconut pollen has been worked out. Botanical studies are in progress on replanted palms and on planting techniques. *Crop protection:* Biological studies on *Oryctes rhinoceros* and *Rhyncophorus ferrugineus* are in progress, together with field experiments on pest control methods. Several insecticides are listed which are effective for termite control in nurseries.

2847. HALDANE, J. B. S.
Suggestions for research on coconuts.
Indian Coconut J., 1958, **12**: 1-9, bibl. 9.

Mainly on selection and breeding.

2848. CHAR, M. S. L.
A preliminary note on the heritability of yield in the coconut.
Indian Coconut J., 1959, **12**: 65-8, bibl. 3.

One method of calculation indicated 49% and another 62% for the genetic component of factors affecting yield.—Coconut Res. Stat., Kasaragod.

2849. PILLAI, R. V., AND SATYABALAN, K.
A note on the seasonal variation in yield, nut characters and copra content in a few cultivars of coconuts.
Indian Coconut J., 1960, **13**: 45-55, bibl. 5.

Seasonal variations have been found in yield, nut characters and copra content amongst some of the exotic coconuts growing at the Kasaragod Coconut Research Station. In general, the highest yield was observed in summer and the lowest during the north-east monsoon period. The largest nuts and maximum copra content in West Coast Tall palms were obtained during summer. This relationship between nut size and copra weight was only noted in some cultivars.

2850. AIYADURAI, S. G.
Subsidiary crops in coconut gardens in Madras State.
Coconut Bull., 1959, **13**: 209-12.

Notes on suitable intercrops.

2851. SAHASRANAMAN, K. N.
***Tephrosia candida*, and ideal green manure bush for Kerala.**
Coconut Bull., 1959, **13**: 223-7, illus.

Composition, yield and management in coconut areas.

2852. RODRIGO, P. A., AND OTHERS.
Some studies on the rejuvenation of run down coconut groves.
Coconut Bull., 1959, **13**: 186-96.

Rejuvenation of neglected 35–45-year-old groves in the Philippines has proved possible using cover crops and fertilizers. Ploughing improved the palms for a limited period. Calopogonium (*C. coerrulum*) and kudzu (*Pueraria phaseoloides*) were the best cover crops, killing weeds and completely covering the ground in one year; by the end of the second year they had significantly increased coconut yields. Fertilizers improved the foliage after 6 months, and the yield after 3 years. NK and NPK combinations produced the greatest yield increases; K increased copra recovery. After 2 years fertilized plots with cover crops did not show any advantage over fertilized ones without a cover crop.—Bur. Plant Ind., Manila.

2853. SANTHIRASEGARAM, K.
Studies on the nutrient status of some coconut soils in Ceylon. I. The lateritic soils on Bandirippuwa estate. C. Optimum requirements of deficient nutrients.
Bull. Coconut Res. Inst. Ceylon **20**, 1959, pp. 21, bibl. 3, illus.

Fertilizer experiments and recommendations for dressings at planting time. [Parts A and B were noted in *H.A.*, 28: 960k.]

2854. MARAR, M. M. K., AND PANDALAI, K. M.
Observations from some long term experimental plots of the coconuts.
Indian Coconut J., 1959, **13**: 1-24, bibl. 27, illus.

Conclusions drawn from 40 years' records at the Kasaragod Coconut Research Station are discussed. Regular cultivation and manuring are both necessary to produce high yields. Manuring in basins appears to be better than digging round the palms but not between them, or than manuring the palms but leaving them uncultivated. In the absence of manuring limited cultivation confined to the base of the palm is of little benefit. Regular cultivation alone and regular cultivation plus manuring are profitable even when the prevailing prices for coconuts are as low as 10 and 50 Rs. per 1,000 nuts, respectively.

2855. JOHN, C. M., AND JACOB, K.
Fertilizer demonstrations on coconuts in West Coast. A review.
Indian Coconut J., 1959, **13**: 25-44.

Results of 5 years' trials in many areas are recorded. Applications of N, P_2O_5 and K_2O (0·75 : 0·75 : 1·50 lb./tree/annum) and green manure, together with intercultivation, gave an additional yield of 744 nuts (35%) or 327 lb. copra (44%) per acre, the net profit being increased by 88 Rs. per acre. In areas affected by "root and leaf" diseases NPK manuring plus the use of fungicides and insecticides markedly improved the health of the palms. The application of NPK had a considerable influence in bringing adult non-bearing trees into bearing, and the use of 33% of additional K resulted in increased yields where the standard dose had failed to produce any response. [See also *H.A.*, 29: 872.]

2856. Pillai, N. G., Sankarasubramoney, H., and Pandalai, K. M.
Laboratory studies on the influence of sodium chloride on moisture conservation in some coconut soils.
Ramanandan, P. L., and Pandalai, K. M.
Field studies on the influence of common salt on moisture conservation in some coconut soils.
Indian Coconut J., 1959, **12**: 52-64, bibl. 30, and 69-76, bibl. 11.

In laboratory and field studies no moisture conservation effect was found in a sandy soil, a red loam and a lateritic gravelly soil as a result of adding 600 and 900 lb. NaCl and 765 lb. muriate of potash per acre.—Cent. Coconut Res. Stat., Kasaragod.

2857. Ziller, R.
Étude de quelques facteurs agissant sur la teneur en coprah des noix de coco. **(A study of certain factors influencing the copra content of coconuts.)**
Oléagineux, 1960, **15**: 73-81, bibl. 14, illus.

The factors discussed are variety, climate, major-element nutrition, and the number of nuts produced per tree. Numerical data are provided in each case. Distinctly favourable effects are recorded for sunshine (particularly during the 4 months preceding maturity) and for K application.

2858. Pandalai, K. M., Sankarasubramoney, H., and Menon, K. P. V.
Studies on soil conditions in relation to the "root" and "leaf" diseases of the coconut palm in Travancore-Cochin. Part VI. The combined water, hygroscopic water, loss on ignition and water-table aspects of coconut soils. Part VII. The mechanical composition of coconut soils of healthy and diseased areas.
Indian Coconut J., 1959, **12**: 87-100, bibl. 28, and 101-13, bibl. 12.

Part VI records a higher combined water percentage in red loam, laterite and sandy soils in disease-free than in diseased areas but the reverse in alluvial loams. In healthy red loam and laterite areas a higher hygroscopic moisture percentage was characteristic. A large proportion of infected areas had a high water table. Part VII records that no significant differences were found in the mechanical composition of soils from healthy and diseased areas. The disease appeared to be prevalent on all the main soil types. Adequate drainage and high fine sand, silt and clay fractions and the absence of any impermeable layer near the surface are essential for healthy growth. [For part V, see *H.A.*, 30: 1254.]

2859. Verghese, E. J.
Chemical studies on the leaf and root (wilt) diseases of coconuts in Travancore-Cochin. I. Some observations of the incidence of the diseases.
Indian Coconut J., 1960, **13**: 76-9.

The possibility of spread by wind or water is discussed, and it is suggested that water, in some way not yet explained, may be the cause or carrier of a parasitic or toxic factor.—Coconut Res. Stat., Kayangulam.

2860. Shanta, P., Menon, K. P. V., and Pillai, K. P.
Ætiology of the wilt (root) disease: investigations on its virological nature.
Indian Coconut J., 1960, **13**: 56-66, bibl. 11.

Results supporting the virus hypothesis [see also *H.A.*, 28: 3067].

2861. McWhorter, F. P.
Coconut cadang-cadang disease investigation project report by the FAO virologist to the Philippine Government (August to December, 1958).
Araneta J. Agric., 1959, **6**: 13-23.

Immediate and future control measures recommended were: (1) the selection and breeding of resistant varieties including the use of imported pollen; (2) the prevention of spread by planting in areas of low infection, by plantation management, by attacking the vector when it is determined, and possibly by the use of chemicals to ward off infection; (3) prolonging the economic life of affected individuals by the use of hormones, such as gibberellin, and certain chemicals, such as cytovirin, and by fertilizer combinations.

2862. Mendiola, N. B.
The necessity of selecting cadang-cadang resistant varieties or strains of coconut or of creating *Cocos* hybrids.
Araneta J. Agric., 1959, **6**: 24-32A, illus.

The article includes an outline of a long-term research project of introduction and testing for resistance, which is to be applied to different *Cocos* species, and to foreign and local varieties of coconut. Species and varieties to be introduced are listed; these include *C. botryophora* and *C. coronata* from Brazil, and varieties *dioica* and *incarnata* of *C. nucifera*.

2863. Kumari, T. O. P., Radha, K., and Kurien, V. C.
Efficacy of copper fungicides with reference to *Helminthosporium halodes*—the leaf rot fungus of coconut.
Indian Coconut J., 1960, **13**: 70-5, bibl. 4.

Laboratory trials of various fungicides have given inconsistent results. Bordeaux was most effective, and Fungimar and Kirti copper were also useful. —Coconut Res. Stat., Kayangulam.

2864. Fenwick, D. W., and Maharaj, S. B.
Presence of *Aphelenchoides cocophilus* in the roots of *Cocos nucifera*, the coconut palm.
Nature, 1960, **185**: 259-60, bibl. 7.

Observations on nematode distribution in a coconut area, in which red ring disease was developing, are described. These suggest that initial infection of the roots occurs some distance from the bole and spreads inwards. Nematodes were also found in the distal parts of the root systems of apparently non-infected trees. It is probable that *A. cocophilus* can remain in the root system for a considerable time before infecting the stem. One tree was observed, however, in which infection started in the crown. [For an earlier report, see *H.A.*, 28: 3069.]—Dep. Agric., Trinidad.

2865. Brown, E. S.
Immature nutfall of coconuts in the Solomon Islands. II. Changes in ant populations, and their relation to vegetation. III. Notes on the life-history and biology of *Amblypelta*.
Bull. ent. Res., 1959, **50**: 523-58, bibl. 4, illus., and 559-66, bibl. 9, illus.

The first paper records observations on the populations of various ant species, some of which favour and others discourage the activities of *Amblypelta*, the cause of premature nutfall. Contrary to previously held belief it was found that heavy creeper growth was not particularly associated with *Oecophylla smaragdina*, a beneficial ant. An experiment involving regular brushing in the marginal zone between rival ant communities also showed that the presence or absence of creepers and other vegetation had little, if any, effect upon changes in ant populations. The second paper includes details of certain parasites and predators. [For part I, see *H.A.*, 30: 1255.]

2866. Nirula, K. K.
Investigations on the pests of the coconut palm. Part V. *Leucopholis coneophora* Burm.
Indian Coconut J., 1958, **12**: 10-34, bibl. 20, illus.

The life-history and habits are described. A 10% BHC dust or spray applied to the soil at 1 cwt. per acre was quite effective in controlling the larvae. [For part IV, see *H.A.*, 29: 881.]

2867. South Pacific Commission.
Report of the Rhinoceros Beetle Technical Advisory Committee Meeting held at Suva, Fiji, 16-19 February 1959, S. Pacific Commiss., 1959, pp. 13.

Control measures under discussion included the use of obstructive vegetation, insecticidal dusts in the crowns of palms, chemical attractants, field sanitation and biological control (including details of recent investigations on *Oryctes* diseases and the use of parasites and predators).

2868. Cohic, F.
Dialeurodicus elongatus Dumbleton, aleurode parasite du cocotier en Nouvelle-Calédonie. **(*D. elongatus*, a white fly parasite of the coconut palm in New Caledonia.)**
Agron. trop., 1959, **14**: 232-8, bibl. 7, illus.

The pest is fully described. Control measures consist of the removal and burning of infested material and of insecticidal treatment of young palms. Care should be taken not to destroy useful predators. White oil with nicotine sulphate or parathion in water emulsion is effective.

2869. Rajasekharan, N., and Pandalai, K. M.
Some aspects of technological research on coconut and its products.
Indian Coconut J., 1960, **13**: 80-8, bibl. 7.

A review, covering copra processing and storage, oil extraction and utilization of sap, leaves, coconut water and shell.

2870. Subrahmanyan, V., and Swaminathan, M.
Coconut as food.
Coconut Bull., 1959, **13**: 153-8.

Composition, including vitamin content, of coconut products.

2871. George, J., and Joshi, H. C.
Complete utilization of coconut husk. I. Building boards from coconut husk.
Indian Coconut J., 1959, **12**: 46-51, bibl. 4.

From unretted husks.

2872. Pollard, J. K., Shantz, E. M., and Steward, F. C.
The growth-promoting activity of coconut milk: the nature of the non-ionic components.
Shantz, E. M., Pollard, J. K., and Steward, F. C.
The growth-promoting activity of coconut milk: the nature of the "active fraction".
From abstrs in *Plant Physiol.*, 1959, **34** (Suppl.): viii-ix.

See also *H.A.*, 29: 71h.

Coffee—general.
(*See also* 3055, 3075.)

2873. U.S. Dep. Agric., Foreign Agricultural Service.
Conditions continue favorable for 1959-60 world coffee crop.
Foreign Agric. Circ. U.S. Dep. Agric. **FCOF 3-59**, 1959, pp. 11.

Now estimated at 67·4 m. bags, an all-time record and approximately 12% above 1958–59.

2874. Lains e Silva, H.
São Tomé e Príncipe e a cultura do café. **(São Tomé and Príncipe islands and the growing of coffee.)** [English summary 35 pp.]
Mem. Jta Invest. Ultramar **1**, 1958, pp. 499, bibl. 257, illus., maps.

A detailed survey, including an index and numerous graphs and photographs. [For a shorter version, see *H.A.*, 29: 4039.]

2875. Portères, R.
Valeur agronomique des caféiers des types kouilou et robusta cultivés en Cote d'Ivoire. **(Agronomic value of the kouilou and robusta types of coffee grown in the Ivory Coast.**
Café, Cacao, Thé, 1959, **3**: 3-13.

The large-beaned robusta and the small-beaned kouilou types are both forms of *C. canephora*. They are compared as to their vegetative, floral, fruit, physiological, parasitological and agronomic characters, and notes are given on varieties within the two types. The varieties are classified in their order of resistance to certain diseases and pests and to drought, and in relation to their need for good soil and shade and their harvesting dates. The distribution of the 2 types and of their varieties within the 3 coffee-growing regions of the Ivory Coast is discussed. It is considered that the hardy "Robusta du Congo Belge", which thrives over a wide area, should be the variety mainly used for the renewal and extension of coffee plantations.

2876. Sandford, H.
Coffee in Tanganyika. How chemicals are used.
Span, 1959, **2**: 78-81, illus.

Fertilizers, trace elements, insecticides and fungicides in current use.

2877. Moh, C. C., and Orbegoso, G.
Effects of ionizing radiations on coffee.
Coffee, Turrialba, [1959], **1**: 26-30, illus.

When exposed to gamma radiation doses of 40–400 r per day typica and bourbon seedlings became stunted and showed abnormalities of leaf shape, colour and venation, of stems and of branching. Plants receiving 20 r or less per day did not show noticeable morphological changes. Typica seedlings from seeds that had been exposed to 2,500 and 5,000 r showed slightly increased height growth, but those from seeds that had been exposed to 10,000 and 20,000 r were stunted and showed changes in leaf colour, shape and number.

Coffee—establishment and culture.

(*See also* 3048.)

2878. Borget, M.
Modes de plantation du *Coffea canephora* var. *robusta* dans le centre Oubangui. Essais entrepris à la Station de Boukoko. **(Methods of planting robusta coffee in the Oubangui centre. Trials at Boukoko Station.)** [English and Spanish summaries 7 and 6 lines.]
Agron. trop., 1959, **14**: 208-24, bibl. 10.

The chief conclusions drawn from 4 years' investigation were: If the plants are to be planted early the seed should be sown direct in the nursery at 15 × 15 cm. If the plants are for late planting the seed should be sown in a germinating bed and transplanted into the nursery either before or when the cotyledons begin to spread. Plants are best transplanted into the field when 6 months old but can be transplanted a year later. Ball planting was superior to bare-root planting. Planting with the Java planting tool gave better results than basket, pot and other methods. Eighteen-month-old plants withstood bare-root planting better than 6-month-old plants. Burying the collar was only injurious if deeply buried. Mulching and farmyard manure were not superior to leaving the soil bare. Temporary shading with a crop of *Cajanus indicus* depressed growth and cropping. The effect of date of planting on rate of establishment was more marked with bare-root-planted plants than with ball-planted plants. Early planting resulted in better growth and yields. Plants rarely recovered fully from mistakes made at planting time. An interesting diagram shows all the possible paths through which an established plant could have passed.

2879. Godoy, C., Jr.
Forçamento de mudas de café. II. Absorção foliar. **(Forcing coffee seedlings. II. Foliar absorption.)**
Rev. Agric. Piracicaba, 1959, **34**: 101-8, bibl. 9.

Two-months-old Caturra Vermelho coffee seedlings were treated with an NPK solution, which was sprayed either on to both plant and substrate or on to the plant or substrate only. In height, fresh weight and shoot number the controls were significantly inferior to the 3 treatments, and the plant-only treatment was significantly inferior to the plant-substrate and the substrate-only treatments. The substrate-only treatment was significantly inferior to the plant-substrate treatment in fresh weight and shoot number. The treated plants were ready for planting out before the controls. [For part I, see *H.A.*, 29: 1899.]—Univ. S. Paulo, Piracicaba.

2880. Castillo Z., J., and Parra H., J.
Efecto tóxico del cobre en semilleros de café. **(The toxic effect of copper in coffee seedbeds.)**
Cenicafé, 1959, **10**: 109-17, bibl. 19.

Root atrophy in very young coffee seedlings proved to be due to Cu toxicity in seedbeds where copper fungicides had been repeatedly used to control *Rhizoctonia* spp. Coffee seeds sown in sterile sand containing 25–1,000 p.p.m. of added Cu in the form of sulphate or red oxide (Cu_2O) germinated normally, but soon afterwards the main roots became atrophied and the lateral roots stunted and swollen. The extent of the injury was directly related to the concentration of Cu, and the oxide was more toxic than the sulphate.

Aspects of toxicity and deficiency of Cu are discussed.

2881. Pang, O. A.
Djarak-tanam pada budidaja kopi robusta di Djawa-Timur. **(The spacing of robusta coffee in East Java.)** [English summary ⅔ p.]
Menara Perkebunan, 1959, **28**: 171-7, bibl. 7, illus.

Although close spacing (7 × 7 ft.) gave higher initial yields per ha., wider spacings (10 × 10 ft. and 12 × 12 ft.) gave higher yields by the 6th year. In a thinning trial trees at 7 × 7 ft. spacing were thinned to 7 × 14 ft. at 9 years of age, but productivity did not improve. It is concluded that systematic thinning should be done at an early stage; selective thinning, however, may give better results.

2882. Machado S., A.
Transformación de plantaciones de café. **(Re-organization of coffee plantations.)**
Cenicafé, 1959, **10**: 217-64, bibl. 48.

A system of gradual replanting is described with operational and economic data.

2883. Forestier, J.
Fertilité des sols des caféières en République Centrafricaine. **(Fertility of the soils of coffee plantations in the Central African Republic.)** [English and Spanish summaries about ⅓ p. each.]
Agron. trop., 1959, **14**: 306-48, bibl. 13.

The first part of this article describes studies on soil moisture under different covers made in unshaded plantations in 1953–56. In one study the fresh berry yields per tree were much higher with clean weeding and with mulching than with cover crops of *Leucaena glauca*, *Ipomoea batatas* or *Paspalum* sp., but clean weeding is undesirable because it favours erosion, and mulching is impracticable in the region in question. In another study 4 cover crops were compared with mulching and clean weeding. *Indigofera arrecta* and *Aeschynomene wrightiana* had agronomic disadvantages. *Pueraria javanica* gave promising results; it maintained the soil moisture content distinctly better than *Ipomoea batatas*, as well as clean weeding but less well than mulching. In a third study the soil moisture content at 0·5 and 1·0 m. depth remained above 10% with all the treatments compared, namely, mulching, clean weeding, 1 herbaceous and 3 shrubby cover crops. The second part of the paper deals with the humus content of soils in the Oubangui-Chari area.—Stat. centr. Boukoko.

2884. Robinson, J. B. [D.].
General nitrogen fertilizer recommendations for mature coffee.
Kenya Coffee, 1959, **24**: 303-5.

Where neither cattle manure nor mulch is applied, sodium nitrate is recommended; elsewhere ammonium sulphate should be used on alkaline or neutral soils, ammonium sulphate nitrate on normal and slightly acid soils, and calcium ammonium nitrate on those of pH 5·2 or less. The fertilizer should be spread evenly beneath the canopy and not confined to the drip circle. Times and rates of application for the various districts are given. The foliar application of a low-biuret-content urea is considered useful for supplementing, but not replacing, ground manuring. Where overhead irrigation is practised, the addition of urea or other forms of N to the water is permissible at low concentrations (½–1%); otherwise further sprinkling with water is necessary to remove concentrated nutrient from the leaves.

2885. Robinson, J. B. D., and Harcombe, G. S.
Urea sprays in coffee. Leaf damage associated with biuret contamination and spray strength.
Kenya Coffee, 1959, **24**: 407-8, bibl. 2, illus.

Experiments with mature arabica trees showed that to avoid leaf scorch the strength of urea should not exceed 1% by weight in medium and high volume sprays, and to prevent biuret chlorosis the level of this contaminant should not be above 1% by weight in the urea. Where the urea strength exceeds 1–2% by weight the biuret content should be below 0·5%.

2886. Anon.
New coffee rotavator proves successful.
E. Afr. Fmr Plant., 1959, **3**(9): 28-9, illus.

A 40-in. rotary hoe fitted to a narrow-gauge tractor.

Coffee—diseases and pests.

(*See also* 2902, 3039, 3045.)

2887. Abrahão, J.
A descoloração das fôlhas do cafeeiro. **(Leaf chlorosis of coffee.)**
Biológico, 1958, **24**: 171-4, bibl. 2, illus.

The disintegration of the chloroplasts reported here was so marked that the young leaves became white, in some instances retaining a few green spots which developed necrotic centres. The symptoms proved to be due to low air temperature, and were reproduced within 3–7 days of exposing coffee plants for 6 hours to 3° C., being particularly marked in plants previously exposed to sunlight. Leaves developing later were unaffected. Painting the surfaces of the chlorotic leaves with 0·6% zinc sulphate did not restore their colour.

2888. Bock, K. R.
Notes on the use of captan sprays in coffee.
Kenya Coffee, 1959, **24**: 405-6.

As a result of extensive trials it is recommended that captan sprays on mature coffee should never be applied at rates lower than 120 gal. per acre. Where single doses of 4½ lb. per acre were applied in February, in March, and again in April, effective control of leaf rust (*Hemileia vastatrix*) was obtained. Used at a high volume (200 gal. per acre) captan controlled the "hot and cold" condition. It proved unsatisfactory, however, for the control of coffee berry disease, *Colletotrichum coffeanum*.

2889. RAYNER, R. W.
Root rot of coffee and ring-barking of shade trees.
Kenya Coffee, 1959, **24**: 361-5, illus.

Disease symptoms and the manner of *Armillaria mellea* infection are described. The importance of ring-barking shade trees properly, to ensure that the roots and associated fungi are killed through exhaustion of metabolites, is stressed as a preventive measure. The removal of infected trees and ring-trenching to 1½–2 ft. remain the most effective treatments where the disease is already established.

2890. CASTAÑO A., J. J.
"Llaga roja" radicular del cafeto y síntomas de dieback en la parte aerea. (**Red root rot of coffee and dieback symptoms of the shoots.**)
Rev. cafet. Colomb., 1959, **15**(137): 43-9, bibl. 6, illus.

Nectria tropica, normally saprophytic in the soil, becomes parasitic on injured coffee roots. Thus hand weeding is preferable to mechanical weeding. When not severely infected, trees may be cured by disinfecting the lesions with 2% formalin and then applying a protective bordeaux paste. Dead and moribund trees should be uprooted and burned, and the soil disinfected with paradichloronitrobenzene. Trees weakened by *Nectria* are frequently attacked on the shoots by *Colletotrichum coffeanum*. Fermate is recommended for its control.

2891. NUTMAN, F. J.
Evidence that the spores of coffee leaf-rust are not dispersed by wind.
Kenya Coffee, 1959, **24**: 451-3, illus.

The distribution of *Hemileia vastatrix* spores is shown to be almost entirely due to water splash during rain.

2892. DROUILLON, R.
La leçon de deux campagnes de désinsectisation dans les plantations de caféiers de l'Oubangui-Chari. (**Conclusion drawn from two seasons' disinfestation in the coffee plantations of Oubangui-Chari.**) [English and Spanish summaries 11 and 10 lines.]
Agron. trop., 1959, **14**: 198-207.

In 1957 insecticidal treatment reduced *Stephanoderes hampei* infestation from 15 to 3–4%, and endrin spray was superior to BHC dust. In 1958 3 l. of 19·6% endrin e.c. (equivalent to 600 g. technical endrin) per ha. were applied in 5–7 l. plantation oil and 2 l. gas oil. This proved insufficient, and it is concluded that for adult plantations the rates should be 750–800 g. in 15 l. per ha.

2893. LAVABRE, E. M.
Le scolyte des branchettes du caféier robusta *Xyleborus morstatti* Haged. (**The robusta coffee shoot scolytid, *X. morstatti*.**)
Café, Cacao, Thé, 1958, **2**: 119-30, bibl. 11, and 1959, **3**: 21-33, bibl. 10, both illus.

In the first part the morphology and life history of the pest are described. In the second part notes on biology and on control problems are followed by an account of field trials carried out in Cameroun in the dry season. Dieldrin and endrin were superior to lindane and gave good control. For young trees 4–6 l. of commercial dieldrin per ha. per treatment are required. Adult trees are seldom severely attacked, but when treatment is necessary 2–3 times the above rates should be applied. The insecticide is best applied in the rainy season in 20–30 l. of oil but may be applied in the dry season in 100–150 l. of water. Since the majority of the entry holes are on the under sides of the shoots application should be from below.—Centr. Rech. agron. N'Kolbisson.

2894. CROWE, T. J.
The yellow-headed borer.
Kenya Coffee, 1959, **24**: 403-4, illus.

If the larvae of *Dirphya nigricornis* have not reached the main stem, cutting off and burning the infested primaries is the best remedy. When the main stem has been attacked the larvae can be killed by injecting the fumigant EDCT into the lowest frass hole and sealing. Alternatively, an insecticide such as dieldrin, 0·18% in kerosene, or pyrethrum may be injected and the hole left unsealed. The larvae in the bore holes may also be speared with a fine wire.

2895. HEINRICH, W. O.
Contribuição para o conhecimento dos hábitos e do combate ao *Cerococcus catenarius* Fonseca, 1957, praga do cafeeiro. (**A contribution to knowledge of the habits and control of *Cerococcus catenarius*, a coffee pest.**)
Biológico, 1959, **25**: 71-9, bibl. 4.

In a trial on the control of this scale insect on Yellow Bourbon coffee there were 4 normal-volume treatments, namely, emulsifiable mineral oil at 0·8–1·0% alone and with either Diazinon at 0·06%, malathion at 0·10% or parathion at 0·02% in 1·4 l. water per tree; and 3 low-volume treatments, namely, Diazinon at 0·42%, malathion at 0·70% or parathion at 0·14% in 0·2 l. per tree. Mineral oil alone, the normal-volume mixtures and the low-volume treatments gave 28, 90–94 and 99–100% control, respectively. It is recommended that 2–3 sprays should be applied at intervals of 15–30 days beginning between mid-September and mid-October.

2896. Heinrich, W. O.
O *Cerococcus catenarius* no Paraná. (***Cerococcus catenarius* in Paraná.**)
Biológico, 1959, **25**: 121-4.

Coffee harvesters frequently spread the newly hatched larvae. Thus plants known to be infested should be harvested early, before the larvae hatch.

2897. Shetty, H. T. R., Swaminathan, B., and Parthasarathy, S.
Insecticides on root mealy bug.
Indian Coffee, 1959, **23**: 356-8, bibl. 1.

Preliminary laboratory studies are reported on the effectiveness of 7 new organophosphate insecticides compared with Folidol for the control of *Pseudococcus citri*. After 8 hours, control was perceptible with Basudin at 0·03% and 0·06%, Ekatin at 0·04%, Folidol at 0·01% and 0·02% and Gusathion at 0·05% and 0·1%, while after 48 hours 40% or more mortality was obtained with all the preparations at one or more concentrations, with the exception of Isochlorothion and Meta-iso-systox.—Coffee Res. Stat. Chethalli, Coorg.

2898. Abrahão, J., and Mamprim, O.
Cochonilla da raiz do cafeeiro. (**Mealy bugs on coffee roots.**)
Biológico, 1958, **24**: 268-71, illus.

Pseudococcus sp. (probably *comstocki*) attacks coffee roots, and its honey-dew supports a fungus, *Bornetina* sp., and attracts symbiotic ants. The plantations infested are always those on poor soil, usually below 6 years of age and near natural forest. n the early stages of infestation, good control has been achieved by removing the soil from the root collar and applying miscible oils, with or without Diazinon or Rhodiatox. The systemic product Thimet, applied to the soil 10 cm. deep, in rings close to the bases of the plants, gave good results, especially when the treatment was carried out at he beginning of the rainy season and was followed by an application of a balanced fertilizer.

2899. Wallis, J. A. N.
Chemical taints in arabica coffee.
World Crops, 1959, **11**: 321-3, bibl. 11, illus.

The following insecticides were tested but caused o tainting: endrin 19% e.c., isodrin 18% e.c., hlordane 75% e.c., Metasystox 50% e.c., pyrethrum 6%, all at 1/500 strength. BHC formulations aused "bricky" flavour. Others causing slight aints are listed. Of the herbicides tested aminoriazole at 5 lb., simazine at 8 lb., monuron at ·2 lb., MH at 8 lb., 2,4-D at 1·3 lb., 2,4,5-T at lb., and MCPA at 1·3 lb. per acre caused no tainting. PCP and CMPP caused "bricky" and "buni" flavours respectively [see also *H.A.*, 29: 356]. Dalapon and 2,4-DES as Sesone were recorded as causing indefinable taints.—Coffee Res. Stat., Kenya.

Coffee—processing and composition.

(*See also* 1573, 3021, 3046, 3054.)

2900. McCloy, J. F.
Research into the mechanical drying of arabica coffee.
A.R. E. Afr. indust. Res. Org. 1957-58, 1958, pp. 9-11.

Investigations into serious loss of quality after 3 weeks' storage of beans dried artificially without exposure to daylight have shown that: (1) ultraviolet radiation causes yellowing of the parchment, (2) visible light causes desirable bleaching of the silver skin and blueness in the endosperm, (3) drying temperatures of over 85° F. cause extreme sourness in the liquor, (4) light raises the allowable drying temperature and can improve the liquor of heat-damaged beans, and (5) the photochemical process is largely independent of dehydration from 54 to 12% moisture content, and exposure to sunlight of dark-dried beans containing 10% moisture can partly restore the damaged appearance. The useful light appears to be in the range of 4,000–5,000 Å. Heat damage sourness is probably due to the endosperm and not to the embryo contents. Light treatment does not affect germination and lethal drying temperatures are apparently higher than liquor damage temperatures. Tests also showed the great importance of avoiding delayed skin drying. Brown discoloration of the silver skin is possibly associated with incomplete fermentation and washing. [See also *H.A.*, 28: 3087.]

2901. Anon.
A step forward in coffee drying.
E. Afr. Fmr Plant., 1958, 3(2): 15, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**, Abstr. 1,478.

The plant described consists basically of a heat exchanger unit and fan supplying air at 100° F. to a plenum below 2 concrete bays, which have perforated aluminium floors, over which are spread 8-in. thick layers of coffee beans. Electronic controls are fitted, which act in the event of flame or fan failure. Cost and construction details are given.

2902. Esteves, A. B. B.
Método radiológico para determinação do grão furado de café cru. II. (**Radiological method for determining borer infestation of fresh coffee beans. II.**) [English summary 1 p.]
Rev. Café portug., 1959, 6(22): 27-54, bibl. 18, illus.

The technique of using a General Electric X-ray seed inspection unit. [For part I, see *H.A.*, 30: 1284.]

2903. WOLFROM, M. L., PLUNKETT, R. A., AND LAVER, M. L.
Carbohydrates of the coffee bean.
J. agric. Food Chem., 1960, **8**: 58-65, bibl. 30.

Green Santos coffee contained 6–7% sucrose and a trace of glucose. Sugar ratios of the holocellulose fractions were L-arabinose, 1; D-galactose, 2; D-glucose, 2; D-mannose, 6. Little, if any, lignin, cellulose or pectin was found. Other constituents identified and estimated were caffeine, trigonelline, caffeic acid, chlorogenic acid, isochlorogenic acid and 10 amino acids.—Ohio St. Univ., Columbus.

2904. GROSS, E.
Café y enfermedades bajo un nuevo aspecto. (**Coffee and illnesses from a new viewpoint.**)
Eco Medico, 1958, No. 3, reprinted in *Rev. cafet. Colomb.*, 1959, **15**: 51-5.

The effects of variety, quality, processing and preparation on the content of assimilable caffeine, and consequently on human health.

Guavas.

2905. NELSON, R. O.
Guava propagation by graftage.
Hort. Advance, 1958, **2**: 61-3, bibl. 4, illus.

See *H.A.*, 25: 3289.

2906. BALASUBRAMANYAM, V. R., AND RANGASWAMI, G.
Parthenocarpy in guava induced by "pollen hormone".
Curr. Sci., 1959, **28**: 413-15, bibl. 4, illus.

Seedless fruits were produced by the Allahabad Round variety when it was self-pollinated and also when the stigmata of emasculated flowers were treated with an aqueous extract of crushed pollen. The pollen of this variety proved non-viable.—Annamalai Univ., Annamalainagar, Madras.

2907. ANDRADE, A. C.
Novo fungicida para controlar a ferrugem da goiabeira. (**New fungicide for the control of guava rust.**)
Biológico, 1959, **25**: 178-9, bibl. 2.

When applied 3 times at monthly intervals beginning at the spring growth flush, 1% bordeaux mixture and an experimental fungicide O 3818 B, consisting of a mixture of nickel chloride and zineb at 0·3%, both gave good control of guava rust (*Puccinia psidii*), reducing the number of infected fruits from 62% in the control to 13–14%.

Jackfruit.

2908. JARRETT, F. M.
Studies in *Artocarpus* and allied genera. III. A revision of *Artocarpus* subgenus *Artocarpus*.
J. Arnold Arbor., 1959, **40**: 113-55, 298-326, 327-68, illus.

Including classification, nomenclature, ecology, biology, and descriptions and distribution of the species, with keys to identification.

2909. RAO, K. R. N., AND SUBRAMANIAM, T. R.
***Glyphodes bivitralis* Guen., as a new pest of jak.**
Indian J. agric. Sci., 1958, **28**: 561-2.

Complete control of the larvae on jackfruit was obtained with BHC spray, 1 lb. 50% w.p. in 6½ gal. water.—Agric. Res. Inst., Coimbatore.

2910. JAIN, N. L., AND LAL, G.
Some studies in the utilization of jack fruit wastes as a source of pectin.
Indian J. Hort., 1957, **14**: 213-22, bibl. 7, [received 1959].

Waste material is about 45% of fruit weight. Details are given of a process for recovering 1·5–2·0% of high grade pectin.—Cent. Food Tech. Res. Inst., Mysore.

Mangoes.

(*See also* 2800, 2818.)

2911. I.C.A.R. STATISTICAL WING.
Study of cultivation practices and yield of mango crops in U.P.
Statist. News Lett., 1959, **9**(1): 6-8.

A survey showed the major varieties to be Malda, Langra, Fazli and Desi; guava was the most frequent intercrop; average spacing was 35 and 32 ft. in pure and mixed stands respectively; 80% of trees were over 15 years old; 26–58% of orchards were irrigated and manuring was more common in the irrigated than in the unirrigated orchards; ploughing was done in half the orchards.

2912. LEDIN, R. B.
Mango varieties in Florida.
Hort. Advance, 1958, **2**: 16-26, bibl. 14, illus.

Twenty-five varieties are described; the leading commercial ones are Haden, Irwin, Kent and Keitt.

2913. OPPENHEIMER, C.
A stock-scion trial with the mango in Israel.
Hort. Advance, 1958, **2**: 27-36, bibl. 4.

Three rootstocks (vigorous, medium and dwarf), and scions of 3 varieties were used. The largest trees were produced using Sabre stocks in spite of its dwarf character. Of the scions tested Mulgoba was unsuitable, but was considered not to be identical with the Indian variety of this name. The 2 other varieties were satisfactory, Pairee producing large trees with relatively small fruits, and Haden

[illegible]

[illegible] mango.

[illegible]

[illegible] *Mangifera indica* [illegible] variation from [illegible] mango [illegible]

[illegible] 28 [illegible]

[illegible] control of anthracnose disease [illegible] mango [illegible]

[illegible] 28 [illegible]

[illegible] damage to mango shoots by [illegible]

[illegible]

[illegible] preservation of mango [illegible]

[illegible]

Oil palms.

(*See also* 2840.)

2925. Institut de Recherches pour les Huiles et Oléagineux (I.R.H.O.).
Rapport annuel 1958. **(Annual Report of the Institute for Research on Oils and Oil Plants for 1958)**, Paris, 1959, pp. 90, illus.

The report includes work in progress on the following crops: *Oil palms:* Breeding and selection, potassium deficiency, yield fluctuations, transpiration as affected by soil management, increased resistance to *Fusarium* infection by Mn application, and control of blast disease by temporary shading and protection from rain. *Coconuts:* Research on Kaïncopé disease, response to K (especially to divided application), and superiority of clean cultivation or intercropping with row crops over cover-cropping with *Centrosema*. *Castor beans:* Breeding and selection. *Shea-butter trees* (*Butyrospermum parkii*): Effect of temperature on fruit set, marcotting, and foliar diagnosis.

2926. Anon.
Palma africana: producción de semilla en Colombia. **(Oil palms: seed production in Colombia.)**
Bol. Divulg. Inst. Fom. algod., 1959, No. 14/15, pp. 15-18.

Produced by artificial pollination; breeding and selection are outlined.

2927. Rees, A. R.
The germination of oil palm seed: the cooling effect.
J. W. Afr. Inst. Oil Palm Res., 1959, **3**: 76-82, bibl. 5.

Excellent germination of *dura* and *tenera* seed was obtained by maintaining fresh seed at the optimum moisture content, as judged visually by air-drying saturated material, at 39·5° C. for 70–80 days. Subsequent cooling to 25–28° C. caused rapid germination starting in 12–15 days and resulted in over 80% germination in 3 months. Heat treatment beyond 80 days showed no advantage. Unfavourable seed moisture contents reduced the germination rate following cooling, although it was still faster than at constant high temperature.

2928. Rees, A. R.
Germination of oil palm seed: large scale germination.
J. W. Afr. Inst. Oil Palm Res., 1959, **3**: 83-95, bibl. 6.

Details are given of the construction and operation of a germinator, in which temperature, humidity and aeration are automatically controlled. In full operation the temperature range was 1·8 °C. and the humidity range 5%. The cost of the building and equipment was £500, of which £150 was for the humidity apparatus. A trial of *dura* and *tenera* seed held at 80% humidity (the highest practicable) and 39·5° C. for 70 days and subsequently cooled to ambient temperature, resulted after 7 weeks, in 74% *dura* and 60% *tenera* germination. The use of the humidifier is not considered economic in comparison with polythene sheeting, because the highest attainable moisture content was below the optimum, but the other apparatus and the building have proved very effective.

2929. Crombie, W. M.
Fat metabolism in the West African oil palm (*Elaeis guineensis*): Part 4. Respiration in the developing seedling.
J. W. Afr. Inst. Oil Palm Res., 1959, **3**: 96-101, bibl. 2.

In the early stages of germination the endosperm had a very low respiration rate and an R.Q. of about 1. Later the rate rose and the R.Q. fell, but for 197 days the value was not sufficiently low to allow conversion of fat into carbohydrate. The haustorium had a considerably higher respiration rate, which decreased as development proceeded; the R.Q. was mostly 0·7–0·8 but dropped to 0·45 at 197 days. Respiration in the root and shoot before photosynthesis started was below that of the haustorium and had an R.Q. of about 1. The outer layers of the haustorium respired 3–4 times as rapidly as the inner cells and had a lower R.Q. This agrees with microchemical tests which showed oil globules to be prominent in the outer, and starch grains in the inner, layers. [For Part 3, see *H.A.*, 28: 4108.]—Univ. Southampton.

2930. Tinker, P. B. H.
Soil heterogeneity and sampling procedure under oil palms.
J. W. Afr. Inst. Oil Palm Res., 1959, **3**: 7-15, bibl. 7.

2931. Hasselo, H. N.
Fertilizing of young oil palms in the Cameroons.
Plant and Soil, 1959, **11**: 113-30, bibl. 13, illus.

The interrelations between N, P, K and Mg in seedling *tenera* plants were assessed visually during 10 months of nursery growth in baskets. Subsequently field observations were made on growth, flowering, incidence of crown disease and chemical composition of the leaves. Vegetative palms responded to dressings of N and K, but neither to P, unless in the presence of K or NK, nor to Mg, except in combination with N alone. As the plants entered the reproductive stage they required much more Mg, lack of which adversely affected leaf length. It was demonstrated that Mg deficiency at the time of first flowering increased the incidence of crown disease and also suppressed growth. This suggests that the disease is a physiological disorder resulting from a nutrient unbalance. Supplying balanced nutrients appeared to have a more pronounced effect on reducing the disease and on increasing the ratio of female to total inflorescences than on the total number of inflorescences produced in the first half year of flowering.—Cameroons Dev. Corp., Ekona.

2932. HOMÈS, M. V.
Études complémentaires sur l'alimentation minérale et la fumure du palmier à huile. **(Complementary studies on the mineral nutrition and fertilization of the oil palm.)**
Publ. Sér. sci. Inst. nat. Étude agron. Congo belge **79**, 1959, pp. 116, bibl. 7, 150 F.

Further confirmatory studies [see *H.A.*, 19: 2482] are described which entailed plant measurement in relation to nutrition. The author reports the optimum nutritional balance as being 40% NO_3, 30% SO_4 and 30% PO_4 for anions, 35% K, 32% Ca and 33% Mg for cations, and an anion/cation ratio of 1·35. Recommendations are made for fertilizers suitable for 3 areas of the Belgian Congo.

2933. NAIR, R. G., AND PILLAI, R. V.
A note on the abnormal developments in an oil palm.
Indian Coconut J., 1959, **12**: 77-81, bibl. 14, illus.

Details of a branched palm.

2934. DAVIS, T. A.
Foliation of certain spadices in an African oil palm *Elaeis guineensis* Jacq.
Sci. and Cult., 1959, **25**: 332-3, bibl. 14, illus.

Such shoots if layered are capable of producing normal inflorescences and fruits.

Papaws.

(*See also* 2800.)

2935. JIMÉNEZ, H.
Injertos entre especies de *Carica*. **(Interspecific grafts of *Carica*.)**
Agron. trop., Venezuela, 1957, **7**: 33-7, illus., from *Biol. Abstr., Sect. D*, 1959, **33**, Abstr. 11,346.

Various species of *Carica*, viz. *papaya*, *monoica*, *candamarcensis*, *cauliflora* and *goudotiana* were easily grafted to one another, and, in particular, *C. cauliflora* was a good stock for species native to higher altitudes. In the graft of *C. goudotiana* on *C. cauliflora*, however, both scion and stock declined as soon as the male inflorescences of *C. goudotiana* appeared, but resumed vigorous growth if the flowering branches were removed, thus suggesting the presence of a substance toxic to *C. cauliflora* in the male inflorescences of *C. goudotiana*.

2936. STOREY, W. B.
Modifications of sex expression in papaya.
Hort. Advance, 1958, **2**: 49-60, bibl. 2 pp., illus.

Classification and genetics of 32 heritable sex forms.

2937. SINGH, L. B., AND TRIPATHI, R. D.
Studies in the preparation of papain. I. Selection of fruits for the first lancing. II. Further observations on the selection of fruits for the first lancing.
Indian J. Hort., 1957, **14**: 77-82, bibl. 2, illus., and 141-4, bibl. 2, [received 1959].

The highest yields of latex and papain from fruits of different ages were obtained from 2-month-old fruits, but 2½-month fruit allowed more economical lancing. In studies on fruit size fruits with a maximum girth of 10·9 in. and a lengthwise circumference of 14·3 in. gave the highest latex and papain yields. Fruits set in July yielded more latex and papain than those set in August. Lancing had no effect on fruit growth or time of maturity, nor did it appreciably reduce final size. [For parts III and IV, see *H.A.*, 28: 3104 and 3103.]—Hort. Res. Stat., Saharanpur.

Pineapples.

(*See also* 1737, 3046.)

2938. SUTHERLAND, G. K., AND GORTNER, W. A.
Studies of a quinyl-*p*-coumarate in the pineapple plant (*Ananas comosus* var. Cayenne).
Reprinted from *Aust. J. Chem.*, 1959, **12**: 240-6, bibl. 25.

It is found in the vegetative plant and serves as a cofactor for pineapple indoleacetic acid oxidase.

Rubber trees.

(*See also* 3054.)

2939. RUBBER RESEARCH INSTITUTE OF CEYLON.
Annual Report of the Rubber Research Institute of Ceylon for 1958, 1959, pp. 129.

Botany department. Ten of the RRIC clones established in 1943 and 1944 gave yields of more than 30 lb. per tree and 4 of over 40 lb. Of the younger clones established in 1947 and 1948 15 have yielded over 20 lb. per tree. Upward "V" cut tapping on virgin bark of 1935-planted trees increased their yields by 46·7% between August and December 1958. Trees previously so treated, which had dropped back to the control yields, gave a 51·3% increase between March 1957 and February 1958 following 2 applications with a 6-month interval of 2,4,5-T in proprietary form. Selection has been started from crosses between the oidium-resistant clone LCB 870 and clone PB 86, and further crosses have been made with high yielding clones, including the partially oidium- and phytophthora-tolerant RRIC 52 and LCB 1320. *Plant pathology department.* In 10 field experiments copper-based dusts proved more effective fungicides against oidium than the organo-metallic and organic compounds tried. No differences were found between cuprous oxide and copper oxychloride compounds or other proprietary formulations containing 4% copper. The effective rates were 8–10 lb. per acre at 5-day intervals. A 1% copper preparation with a special sticker was as effective as the ordinary 4% copper dusts. The most effective agent against bark rot disease (*Phytophthora palmivora*) was the organo-mercury compound Antimucin, while Tillex liquid gave the best results against white root disease (*Fomes lignosus*). *Soils department.* Preventive measures against Mg deficiency included the incorporation of Mg in the NPK fertilizer, the reduction of K in such mixtures, and the use of dolomitic lime. Epsom salts are recommended as a curative measure. NPK trials continued to underline the consistent response to P. Two rhizobial strains found suitable for N fixation under field conditions have been bulk-cultured and issued to estates. Guatemala grass, *Tripsacum laxum*, increasingly grown as a cover crop and for thatching, has been found to be rich in K.

2940. ROSS, J. M.
Breeding and selection in *Hevea brasiliensis*.
Planter, Kuala Lumpur, 1959, **35**: 548-54, 558.

A popular account of methods and achievements.

2941. C.P.V. EXPERIMENT STATION, BOGOR.
Hevea planting recommendations 1959/1960.
Menara Perkebunan, 1959, **28**: 157-60, illus., [in Indonesian pp. 151-6].

Descriptions are given of clones GT 1, WR 101 and LCB 479 recommended for large-scale planting, i.e. up to 80% of the plantation, and of PR 226, PR 228, RRIM 501 and LCB 1320 recommended for small-scale planting. Others are suggested for experimental scale plantings.

2942. ANON.
Developments in the propagation of hevea.
Plant. Bull. R.R.I.M., 1959, No. 45, pp. 143-6, illus.

In order to obtain high-yielding clones grown on their own roots, attempts have been made to propagate them by cuttings. Cuttings from juvenile seedlings root easily under mist, and a high percentage of shoots taken from 1-year-old seedlings rooted in 4–5 weeks. Clones did not root so readily, but with PB 86 and GT 1 rooting was satisfactory, beginning about 40 days after planting and reaching 90% in some batches. The technique of transferring rooted cuttings from the mist chamber to the plantation has not yet been fully mastered.

2943. LEVANDOWSKY, D. W.
Propagation of clonal *Hevea brasiliensis* by cuttings.
Trop. Agriculture Trin., 1959, **36**: 247-57, bibl. 15, illus.

An account is given of a successful Liberian method. Between 10 and 20 days after removing superfluous leaves and ringing to induce callusing, the tip cutting is severed from the mother plant a little below the callus. The excess stem below the callus is trimmed to a point, the leaves are cut to about half their size and each cutting is dipped in a fungicide and a root-growth substance. The cuttings are planted in mist-irrigated propagation beds, and, when rooted, they are potted in perforated insulating-felt tubes and grown on for a month before planting in the field, where growth is very rapid. Survival rates for 500 plants one year after planting out were 74% for fertilized rows and 64% for unfertilized rows.

2944. BAPTISTE, E. D. C., AND JEEVARATNAM, A. J.
A note on Guatemala grass as mulch for rubber plants.
Quart. J. Rubb. Res. Inst. Ceylon, 1959, **35**: 26-31, bibl. 3, illus.

Among the advantages claimed for the use of *Tripsacum laxum* as a mulch on rubber estates are: it produces heavy crops of high nutrient status, e.g. in the 3rd year it yields 20 tons of dry matter per acre containing 0·73% of N, 1·69% of K and 0·07% of P; it causes no check or retardation of growth of legume cover crops; it is deep rooted and improves soil crumb structure; there is little seed production and therefore slight risk of it becoming a weed problem. The grass can be grown between the rows in young plantations, but not closer to the trees than 5 ft., and can be cut 3 to 4 times per year.

2945. RUBBER RESEARCH INSTITUTE OF CEYLON.
Manuring of rubber.
Adv. Circ. Rubb. Res. Inst. Ceylon **66**, 1959, pp. 9.

The NPK mixtures recommended for budded and clonal seedling rubber range from 4 : 6 : 2 to 4 : 6 : 5 depending on the soil, and they should be supplemented with Mg and dolomite except on limestone-derived soils. They should be applied annually at rates ranging from 8 oz. per plant in 4 or more applications during the first year after planting to 48–64 oz. in 2 applications in the 7th and subsequent years. Recommendations are also made for nursery plants and cover crops.

2946. COMPAGNON, P.
Fumure potassique de l'hévéa. **(Potash manuring of hevea.)**
Potassium Symposium 1958, [1959], pp. 345-9.

This article includes reference to a case in Viêtnam in which copper sulphate applied to the soil at 12 kg./ha. caused an increase of 27% in leaf K content and nearly 5% in rubber yield.

2947. ROSSETTI, V.
O oidio da seringueira. **(Mildew of hevea.)**
Biológico, 1958, **24**: 260-7, bibl. 19, illus.

Oidium heveae infects the alternative hosts *Jatropha curcas* and *Euphorbia pilulifera*. Its attacks on hevea are favoured by a temperature of 13–17° C. and a R.H. of 75–80%, by slow growth and by Zn deficiency. Trees receiving N, P, K, Mg and Ca are more susceptible, but also more capable of recovery, than those not fertilized. The disease can be controlled by dusting with sulphur when the growth flush is beginning and repeating the treatment weekly throughout the early leafing period. Wide spacing and the use of windbreaks reduce the spread of the disease.

2948. R.R.I.M., BOTANICAL DIVISION.
Stimulation of the yield of rubber trees as a routine estate practice.
Plant. Bull. R.R.I.M., 1959, No. 45, pp. 127-42.

The 4 proprietary yield stimulants available in Malaya, of which 3 contain 2,4,5-T and the other 2,4-D, have been under test since 1951. Methods for their application on lightly scraped bark below the tapping cut, on renewing bark above the cut and on unscraped bark below the cut are described. Treatment of young trees recently brought into tapping checked growth even more severely than the tapping alone, but 18-year-old buddings and seedlings responded markedly to stimulants without any appreciable retardation of growth. A decreasing response was found to successive applications. Clonal seedlings, which were 20 years old when half-yearly treatment was started, gave an average increase in yield of 36·5% over 7 years, while unselected seedlings behaved similarly at a much lower level of production. In an experiment on mixed buddings an increase of 300 lb. of rubber per acre per year over 5 years was recorded. It was observed that trees growing under poor environmental conditions did not respond well to stimulation. With regard to effects other than increased yield it was noted that the incidence of brown bast was not affected, that the rate of latex flow was only slightly increased, that there was a tendency towards reduced precoagulation, and that in the latex the dry rubber content was lower and the volatile fatty acid figure nearly double. Complete stimulation and tapping schedules are given for buddings and seedlings.

2949. DE S[ILVA], C. A.
Double-cut tapping systems with budded rubber for economic yields.
Quart. J. Rubb. Res. Inst. Ceylon, 1959, **35**: 41-2.

Young, moderately high yielding trees tapped on 2S/2, d/3, 133%, compared with the standard S/2, d/3, 100%, yield much above the theoretical increase of 33% in tapping intensity, but at the expense of future growth. The double-four system, 2S/2, d/4, 100%, can be used on budded rubber about the 4th tapping year with an expectation of a 12–20% increase in yield, but this system should not be used where the annual rainfall is below 100 in.

2950. DE SOUZA, H. B.
O cipó babão (*Cissus gongylodes* Baker)um agente coagulante do latex de hevea. (Notas prévias.) (***Cissus gongylodes* as a coagulating agent for hevea latex. Preliminary note.)**
Bol. téc. Inst. Agron. Norte, 1956, **31**: 163-86, from *Biol. Abstr., Sect. D*, 1960, **35**, Abstr. 5,733.

Rubber obtained in the Amazon Basin using this plant to coagulate the latex was very similar to that prepared with acetic acid.

2951. MCMULLEN, A. I.
Co-factors in *Hevea brasiliensis* latex serum.
Nature, 1960, **185**: 103, bibl. 5.

Samples of normal latex sera contained approximately 0·7 micromole of glutathione and 0·4 of cysteine per ml. and at least 0·0005% of nucleoside diphosphate as adenosine and cytidine diphosphates (mostly the former) and almost as much nucleoside triphosphate mainly as cytidine triphosphate.—Brit. Rubb. Prod. Res. Ass., Welwyn.

2952. MCMULLEN, A. I.
Nucleotides of *Hevea brasiliensis* latex: a ribonucleoprotein component.
Biochem. J., 1959, **72**: 545-9, bibl. 23.

Isolation and characterization.

Sugar cane—general.

(*See also* 3075.)

2953. CUNHA DA SILVEIRA, J.
A investigação científica e o progresso da indústria açucareira. O caso português. **(Scientific research and progress in the sugar industry. The Portuguese aspect.)**
Agros, 1959, **42**: 387-400.

Outlines of progress in sugar cane growing in Angola, Mozambique and many other countries.

2954. VAN GIGCH, F. L., AND OTHERS.
Manejo de fincas cañeras en Tucumán. **(Management of sugar cane plantations in Tucumán.)**
Idia, 1959, No. 142, pp. 1-37, illus.

Production and economics for the period 1943-1955.

2955. D[UTTA], S. K.
Sugarcane cultivation.
Ser. Tea Res. Inst. Tocklai **139**, 1959, pp. 7.

Includes advice on varieties and pest and disease control in Assam.

2956. SHRIKHANDE, J. G., AND IYER, S. S.
Sugarcane research in U.P.
Indian Sugar, 1959, **9**: 221-3.

Work at Shahjahanpur and its subsidiary stations reviewed.

Sugar cane—breeding and varieties.

(*See also* 2182.)

2957. SKINNER, J. C.
Controlled pollination of sugar cane.
Tech. Commun. Qd Bur. Sugar Exp. Stats **1**, 1959, pp. 20, bibl. 26, illus.

Space isolation in open forest and voile-covered crossing lanterns both permitted considerable cross-pollination. Pollen proof lanterns made from closely woven cotton have been designed for research purposes, which excluded all foreign pollen when closed at the base. For ordinary seed production the base could be left open ensuring over 90% isolation and a satisfactory seed yield. Deep-freeze storage has increased the life of viable seed to over 2 years.

2958. PRICE, S.
Critique on apomixis in sugarcane.
Econ. Bot., 1959, **13**: 67-74, bibl. 15.

The evidence reviewed; it may occur only infrequently.

2959. D'EMMEREZ DE CHARMOY, D.
Le rôle des cannes hybrides dans l'évolution de l'industrie sucrière réunionnaise. **(The importance of hybrid varieties in the development of the sugar cane industry of Réunion.)**
Rev. agric. Réunion, 1959, **59**: 201-11.

The use of hybrids between *Saccharum officinarum*, *S. barberi* and *S. spontaneum* has proved the best means of protection against diseases, particularly gumming disease, red rot and mosaic.

2960. ILAGAN, M. T., CALMA, V. C., AND LANDICHO, B. M.
Trial planting of young first-year sugar cane seedlings from cuttings.
Sugar News, 1959, **35**: 480-1, bibl. 2.

Plants grown from 3-node cuttings taken from the upper parts of the immature stalks of 5-month-old cane seedlings produced significantly fewer tillers, and also millable stalks with smaller diameters but not smaller average heights, than plants grown from the corresponding stubs (i.e. a 1-ft. stump plus the root system).—Coll. Agric., Univ. Philippines.

2961. TABAYOYONG, F. T., AND BASILA, F. A.
A review of the variety X fertilizer tests harvested during the 1957-58 crop year in the Victorias Milling District.
Sugar News, 1959, **35**: 327-36, bibl. 3.

P.O.J.3016 and C.P.29/116 were significantly outyielded by Co.449, Co.440 and N:Co.310. The 3 latter varieties differed insignificantly in mean sugar yield, but N:Co.310 gave significantly lower cane yields. B.41-227, P.O.J.3016, C.P.29/116 and VMC.47-67 gave similar sugar yields, although the cane yields of the latter 2 were significantly higher. P.O.J.3016 and N:Co.310 produced the best quality juice. The most profitable yields of Co.449, Co.440, N:Co.310 and C.P.29/116 were obtained using 100 : 120 : 140, 120 : 140 : 160, 120 : 140 : 180 and 80 : 80 : 60 kg. of N, P_2O_5 and K_2O per ha., respectively. A significant interaction between variety and fertilizer was only obtained in one test.

2962. APACIBLE, A. R.
Quality ratio of seven commercial varieties of sugarcane grown in Fajinante Farm Tuy, Batangas.
Sugar News, 1959, **35**: 470-3.

P.O.J. 3016 produced the highest yield of sugar per acre in both plant and second ratoon crops, and the highest average purity for the combined crops (the first ratoon crop was not recorded).

2963. HUGHES, C. G., AND SKINNER, S. O.
Q.57 and blue-top.
Cane Grs' quart. Bull., 1959, **23**: 69, illus.

The self-stripping habit of this variety enabled a good burn to be obtained in spite of a heavy infestation of blue top weed (*Ageratum* sp.) which normally interferes with burning.

Sugar cane—planting and culture.

(*See also* 2960, 2973.)

2964. SALDARRIAGA V., M.
Siembre bien su caña de azúcar. **(Plant your sugar cane well.)**
Agric. trop. Bogotá, 1959, **15**: 431-5, illus.

Choice of material, spacing and planting depth and contouring in Colombia.

2965. CARTER, W. H.
Rotary tillage in sugar cane production.
Sugar J., 1959, **22**(5): 33-5, illus.

The various uses of rotary tillage are reviewed, particularly stubble destruction at the end of a rotation when large fragments of cane in which borer larvae can survive are undesirable. The cutting action and knife position are considered in detail.

2966. LOCSIN, C.
Nuevo implemento para el cultivo de retoños de caña. **(A new implement for the cultivation of sugar cane ratoons.)**
Bol. Asoc. Téc. azuc., 1959, **18**: 185-7, from *Supl. bibl. Turrialba*, 1959, **9**, Abstr. 182/59.

A stubble shaver is described which cuts the cane stems at a low level and can penetrate 6–12 in. into the soil.

2967. SHRIKHANDE, J. G., AND VERMA, H. P.
When to irrigate sugarcane, and how many times.
Indian Fmg, 1959, **9**(6): 11-13, 29, illus.

Irrigating sugar cane during the pre-monsoon period with 3·5 acre/in. per irrigation proved better than either 2·6 or 4·5 acre/in. Increasing the number of applications from 3 to 6 gave a

12·6% higher yield. From April onwards the maximum permissible period between irrigations was 20 days. Whereas setts planted in February or March were not affected by the time of irrigation, a yield increase of 55% was obtained by irrigation after instead of before planting in April. Post-monsoon irrigation was only beneficial in years of deficient rainfall; at other times it resulted in delayed maturity and lower sugar content. Co. 453, CoS. 321 and CoS. 510 were the most drought-resistant varieties. Mulching with cane trash or paddy husk gave a 43% increase in cane grown with inadequate irrigation.—Main Sugarcane Res. Stat., Shahjahanpur.

2968. Ewart, G. Y.
The management of water on Hawaii sugar cane plantations.
Sugar J., 1959, **22**(5): 9-17, bibl. 9.

It is maintained that the Bouyoucos gypsum block method gives a more accurate indication of soil moisture than the tensiometric method even in soils saline to the limits of sugar cane tolerance. Costings of an irrigation programme controlled by blocks are detailed.

Sugar cane—nutrition.

(*See also* 2961, 2980.)

2969. Chopra, S. K.
Sugarcane manuring and press mud cake from sulphitation sugar factories.
Indian Sugar, 1959, **9**: 205-7.

To maintain soil fertility cane fields on the calcium and partially leached calcium soils of the Deoria and Gorakhpur districts of Uttar Pradesh should be supplied with (1) 125 maunds per acre of press mud compost, containing 1% N, 3% P_2O_5, 1% K_2O and 8% CaO, on preparation of the seedbed, (2) 30 lb. of N as oilcake plus 40 lb. of N as sulphate of ammonia, half on planting and half as a top dressing, and (3) 3 maunds of superphosphate at planting time in furrows 3 in. below the setts. Leached calcium soils should receive a similar dressing of press mud compost and 35 lb. of N as oilcake plus 45 lb. of N as sulphate of ammonia.—Lord Krishna Sugar Mills Ltd., Saharanpur.

2970. I.C.A.R. Statistical Wing.
Statistical analysis of long-term manurial experiments.
Statist. News Lett., 1959, **9**(1): 9-11, and 9(2): 2-6.

Two experiments with sugar cane are described. In the first, an NPK trial, 17 years' results showed continuous responses to N but also yield deterioration associated with low pH, CaO, total exchangeable bases and exchangeable calcium, which were attributable to the use of ammonium sulphate. In the second trial similar deterioration was initially arrested by the use of compost. The response to N was greater when applied as groundnut cake than as ammonium sulphate.

2971. de Araujo, R. A., de Araujo, W. A., and del Peloso, E. J. M.
Adubação mineral de cana de açucar na zona de mata de Minas Gerais. **(Mineral fertilizing of sugar cane in the forest zone of Minas Gerais.)**
Bol. Agric. Dep. Prod. veg. Minas Gerais, 1957, **6**(11/12): 5-23, from *Supl. bibl. Turrialba*, 1959, **9**, Abstr. 61/59.

Organic and inorganic manuring gave similar results. In most instances there were yield responses to N and P, but not to K.

2972. Ranganathan, V., and Raja, R. P.
Vegetative growth index as a guide to nitrogen manuring of sugarcane.
Indian Sugar, 1959, **9**: 199-202, bibl. 9.

In investigations on Co. 419 and Co. 449 nitrogen was applied at rates ranging from nil to 500 lb. N per acre 50 and 100 days after planting, and leaf samples were taken just before the 1st and just before the 2nd manuring and 145 days after planting. The weight of the standard leaf was found to be a useful index of vegetative growth and of final yield. The vegetative growth index indicated the maximum economic rate of N. For example, with Co. 419, the maximum leaf weight at 145 days was given by 300 lb. N per acre, which produced a yield of 55·3 tons cane per acre.—Cent. Sugarcane Res. Stat., Cuddalore.

2973. Kulkarni, K. R.
Optimum water and manurial requirements of sugarcane on Ghataprabha left bank canal.
Mysore agric. J., 1959, **34**: 25-7.

Over 4 years the application of a 200-lb. N top dressing per acre, in place of 100 lb., increased the yield of cane by 6·29 tons per acre per annum. The fertilizer used consisted of 330 lb. of ammonium sulphate and 2,000 lb. of ground nut cake applied in 4 doses. The total water requirement of the crop was found to be 115 acre/in. per annum, of which 25 are normally supplied by rainfall.

2974. Vallance, L. G.
Nitrogen—splitting the application.
Cane Grs' quart. Bull., 1959, **23**: 57.

Sulphate of ammonia at 2, 4 and 6 cwt./acre was applied to sugar cane as top dressings in 1, 2 and 3 applications. The 4-cwt. level was the best, and neither the yield of cane nor sugar per acre benefited from splitting the application at any level.

2975. Basila, F. A.
Cane and sugar yield responses of POJ 3016, H37-1933 and CP 29/116 to phosphorus and potassium fertilization in Victorias Milling District.
Sugar News, 1959, **35**: 482-5, bibl. 7.

Potash at 0, 75, 150 and 300 kg./ha. and phosphate at 0, 50, 100 and 200 kg./ha. were applied in 16 experiments with P.O.J. 3016, 6 with H.37-1933 and 4 with C.P.29/116. The overall effect of K_2O in all experiments was an increase in sugar yield of 6%, 10% and 14% for the application of 75, 150 and 300 kg./ha., respectively, whereas the greatest increase due to P_2O_5 occurred at the 100 kg. level. Cane and sugar yields were significantly increased by K_2O in both P.O.J. 3016 and H.37-1933, but by P_2O_5 only in P.O.J. 3016. The yields of C.P.29/116 were not significantly affected by either fertilizer, although yields tended to increase with an increase of K_2O. There was also a highly significant interaction between the two nutrients at the highest levels in the case of P.O.J. 3016.

2976. Teterin, V. P.
The effectiveness of phosphoro-potassium fertilizers for sugar cane grown in irrigated grey-soil regions in the southern part of central Asia. [Russian.]
Doklady Akad. Nauk Tadž.S.S.R., 1959, **2**(2): 45-9, bibl. 5.

Soil applications of P or PK fertilizers, in addition to a basic dressing of N, counteracted the adverse effect of N on the sugar content of the cane, increasing it by 4·1–11·6%. P and PK also increased yield and quality. An N:P:K ratio of 150:250:200 has been successfully used in breeding and selection centres.

2977. Humbert, R. P.
Potash fertilization in the Hawaiian sugar industry. [Spanish, German and French summaries 1¼ pp. each.]
Potassium Symposium 1958, [1959], pp. 319-44, bibl. 34.

A review of work published since 1925.

2978. Venema, K. C. W.
Deficiency symptoms of some elements as manifested by sugar-cane.
Potash and trop. Agric., 1959, **2**: 50-69, bibl. 77.

B, Ca, Cl, Cu, Fe, Mg, Mn, Mo, N, P, K, S and Zn.

Sugar cane—physiology and composition.

2979. Burr, G. O., and others.
The circulatory system of the sugarcane plant.
Proc. 1st (UNESCO) int. Conf. sci. Res., 1958, **4**: 351-68, illus., from *Biol. Abstr., Sect. D*, 1959, **34**, Abstr. 2,605.

Studies of photosynthesis and translocation using radioactive isotopes are described, and the data discussed in this paper were chosen to demonstrate the interdependence of all parts of the sugar cane plant. For example, in glasshouses, in which root and air temperatures were independently controlled, translocation of labelled carbohydrates from the leaf was found to be more dependent on the temperature of the roots than on that of the aerial parts. Linear rates of movement of organic and inorganic substances were measured, and the data are presented graphically.—Hawaiian Sugar Plant. Ass., Honolulu.

2980. Lal, K. N., and Tandon, J. N.
Growth and physico-chemical properties of sugarcane sap as affected by deficiencies of nitrogen, phosphorus and potassium.
Effect of nitrogen, phosphorus and potassium on growth characters and physico-chemical properties of sugarcane sap.
Indian J. agric. Sci., 1958, **28**: 311-24, bibl. 18, and 325-43, bibl. 17.

In sand culture studies on Co. 453 described in the first paper tiller number was reduced by deficiencies of N and P, shoot height by deficiencies of N and K, and leaf area, leaf weight and cane height by deficiencies of N, P and K. N deficiency increased osmotic pressure, bound water content and the bound/free water ratio and reduced total moisture, the free water content, acidity and electrical potential. P deficiency increased the surface tension and specific electrical conductivity and reduced density, viscosity, electrical resistance, the solute concentration and osmotic pressure. With K deficiency the solute concentration was slightly increased at 190 days, and the electrical potential and free water content at 100 days, after planting; surface tension and specific electrical conductivity were reduced at 190 days, and osmotic pressure, pH and the bound water content at 100 days. In the second paper similar studies are described, which showed that more N was required for early than for late growth and slightly more P and much more K for late than for early growth. An investigation was made of the effects of different rates of N, P and K on growth characters, on leaf and stem sap and on water fractions in tissues. —Banaras Hindu Univ.

2981. Lal, K. N., and Tandon, J. N.
Physico-chemical properties of sugar cane sap as affected by shoot development and plant parts.
Indian J. agric. Sci., 1958, **28**: 273-83, bibl. 7.

There were significant differences in density, surface tension, viscosity, osmotic pressure and solute concentration between the 5 varieties investigated, CoS. 109 and Co. 312 having the best properties. Pre-monsoon shoots were high in density, surface tension, viscosity and bound-water content and low in solute concentration. Post-monsoon shoots were high in solute concentration but low in density, viscosity and osmotic pressure. Bound-water content increased with age. The upper parts of cane shoots were usually higher in surface tension and bound-water content but were low in density, viscosity and osmotic pressure. The middle parts of shoots were high in solute concentration but were low in surface tension and bound-water content. The bottom parts of shoots were high in osmotic pressure, density and viscosity but were low in solute concentration.—Banaras Hindu Univ.

2982. RAO, K. C., AND AIYAR, K. V. G.
On the amino-acid nitrogen content of cane juices.
Curr. Sci., 1959, **28**: 289-90, bibl. 4.

Data are given for 9 Co. varieties, which show a range in amino-acid contents from 15 mg. in 100 g. juice for Co. 1244 to 59 mg. in Co. 1251. Varieties with the larger contents had higher values for gur colour.

Sugar cane—diseases and pests.

(*See also* 2959, 2965, 3045.)

2983. STURGESS, O. W.
Transmission of chlorotic streak disease.
Cane Grs' quart. Bull., 1959, **23**: 42-4, illus.

Describes the gravel culture technique using nutrient solutions, by means of which it has been proved that this disease is water-borne.

2984. ANTOINE, R.
Progrès dans la lutte contre la maladie du rabougrissement des repousses à l'Île Maurice. **(Progress in the control of ratoon stunting disease in Mauritius.)**
Rev. agric. sucr. Maurice, 1959, **38**: 214-21, bibl. 1, illus.

The main sugar cane varieties in Mauritius (except for B. 37172) showed a 30% reduction in germination after hot-water treatment. Observations on the effect of various factors on germination after hot-water treatment show that the physiological state of the cutting is the most important. Cuttings for treatment should be taken when shoot growth is at its lowest.

2985. B[ATES], G.
Heat treating cane varieties at Meringa.
Cane Grs' quart. Bull., 1959, **23**: 51.

Experience has shown that hot-water treatment for atoon stunting disease control should not be carried out in the cold season, that the top sections of non-arrowed stalks should be used, that the land or planting should be in fine tilth with adequate moisture, and that only a light soil cover should be used and the soil consolidated around the setts.

986. LONG, W. H., AND OTHERS.
Control of the sugarcane borer with insecticides.
J. econ. Ent., 1959, **52**: 821-4, bibl. 5.

ee *H.A.*, 29: 4103.

2987. GUPTA, B. D.
Insect pests of sugarcane in India. IV. The green borer *Raphimatopus ablutella* Zell.
Indian Sugar, 1959, **9**: 269-71, bibl. 8, illus.

In addition to cultural control measures, borer incidence may be reduced by applying 1·0% γ BHC emulsion to the setts, and also by working 5 lb. of BHC dust per acre into the soil. [For part III, see *H.A.*, 30: 1392.]—Indian Inst. Sugarcane Res., Lucknow.

2988. MUNGOMERY, R. W.
BHC for wireworm control. Do not use weak mixtures!
Cane Grs' quart. Bull., 1959, **23**: 65-6.

The practice of spraying setts with organo-mercury compounds prior to planting has led to a deleterious interaction between fertilizer and wet spray. A BHC-fertilizer mixture should be placed 1 in. away from the setts, and the dosage maintained at 10 lb. of 20% BHC dust per acre or its lindane equivalent.

Sugar cane—harvesting.

2989. WATT, E. C.
A new concept in cane transport. The unit system.
Cane Transp. News, 1959, **2**(1): 3, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**, Abstr. 1,574.

The use of 36-ft. semi-trailers fitted with hydraulically operated support legs, in conjunction with a track-laying tractor having forward-mounted controls and a fifth wheel at the rear, is described.

2990. RODRÍGUEZ GARCÍA, O., AND MARIANO RÍOS, J.
Estudio económico sobre el arrastre de caña de azúcar en camiones, Puerto Rico, 1954. **(An economic study of lorry transport of sugar cane, Puerto Rico, 1954.)** [English summary 2 pp.]
Bol. Estac. exp. agríc. Univ. P.R. **142**, 1958, pp. 32, bibl. 4.

2991. DEKKER, K. D.
The loss of sucrose in cut cane.
S. Afr. Sugar J., 1959, **43**: 889, bibl. 1.

Losses at the rate of 1% per day can occur between cutting and grinding through respiration and inversion.

Tea.

(*See also* 3054.)

2992. GOKHALE, N. G.
Report on a tour of the U.S.S.R. and seven East European countries—summer 1958.
Mem. Tocklai exp. Stat. **25**, 1958, pp. 30, illus.

Much data on Russian tea production is provided, including photographs and particulars of machines and attachments described briefly earlier [see *H.A.*, 29: 4116].

2993. MAHADEVA, B., AND OTHERS.
Report on the visit to the tea producing areas in Georgia, U.S.S.R., by a delegation from the Tea Research Institute of Ceylon.
Tea Quart., 1959, **30**: 5-18, illus.

Covering all aspects of tea production.

2994. STOFFELS, E. H. J.
L'aménagement des germoirs et des pépinières de théiers. (**Management of tea germinating boxes and nurseries.**) [Flemish summary ¾ p.]
Bull. agric. Congo belge, 1959, **50**: 949-55, illus.

An account is given of a successful method of accelerating the germination of tea seeds under conditions in which the temperature is not high enough to ensure rapid germination. Layers of seeds are placed in sand in an uncovered germinating box (described and illustrated) resting on a bed of fermenting vegetable matter and are watered daily or every 2 days. Germination begins after a week and is completed in 6 weeks. Germinated seeds are removed twice weekly and transplanted either direct into the nursery or into pre-nursery beds, from which they are removed to the nursery when the radicle is several cm. long. Nursery practice is described.—Inst. agron. État, Gembloux.

2995. VISSER, T., KEHL, F. H., and TILLIKERATNE, L. M. DE W.
Propagation of tea cuttings. I. Soil and nutrient requirements.
VISSER, T.
Idem. II. Shade and water requirements. III. The influence of the nodal leaf on rooting, growth and flower development.
Bull. Tea Res. Inst. Ceylon **1** (n.s.), 1959, pp. 40, bibls 9, 10 and 10, illus.

Of the soils tested for propagation, an old grass soil was the best and subsoil was a good substitute. Sand and/or peat should be added as required to maintain the optimum water-holding capacity, but the addition of fertilizers should be delayed until after rooting. A pH of about 4·5 was most suitable for rooting. Soil from an old tea field was not suitable. Automatic mist spraying used less than half the amount of water, under the same shading conditions. as hand watering. During rooting shading with ⅛ to ⅜ in. mesh coir netting was most satisfactory, but for subsequent growth more light should be admitted. The amount of shade and the watering requirements were closely interrelated. Rooting increased with increasing nodal leaf size up to 600 mg., but cuttings with leaves larger than this rooted less readily. The presence of flower buds on the cuttings decreased root and shoot weights and increased deaths from scorch. Halving or removing the nodal leaf at planting did not reduce root initiation but depressed subsequent growth.

2996. EDEN, T.
The manuring of tea.
Outlook on Agric., 1959, **2**: 151-7, bibl. 27.

Most of the soils on which tea is grown are of low fertility, and high yields cannot be obtained without liberal manuring. Nitrogen is the chief requirement, and its application up to 100 lb. per acre will usually give economic responses from tea in good condition, if local needs of P and K are met. Account must also be taken in treating the crop of such important factors as type of tea, age of bushes, and the pruning regime. [Author's synopsis.] The author discusses the results of experiments made in India, Ceylon, Indonesia and E. Africa and the factors which complicate the decision of the planter as to with what, how much and when to manure his tea.

2997. TOLHURST, J. A. H.
Revised suggestions for dolomite and magnesium sulphate applications to tea.
Tea Quart., 1959, **30**: 48-9, bibl. 3.

Dolomite at 70–130 lb./acre/annum on mature tea depending on yield, and magnesium sulphate at 14 lb. per 100 lb. of NPK mixture applied to young tea.

2998. BARUA, D. N., AND DUTTA, K. N.
Mineral content of shaded tea leaves.
Curr. Sci., 1959, **28**: 273-5, bibl. 6.

Loosely woven bamboo baskets, 18 × 6 in., which permitted 50–55% of full sunlight to pass were used to shade selected shoots on bushes from 3 clones. Clones differed significantly from each other in dry weight and weight of ash per leaf whether shaded or unshaded. Dry weight was not significantly altered by a reduction of light intensity. The relative order of ash percentages amongst the clones in full sun was completely reversed by shading. Shading also produced a change in the mineral content of the leaf. A reduction of light intensity to 70 and 50% of full sunlight increased the ash weight and decreased the phloem index. It appears that mineral metabolism can be modified by altering the illumination of the leaves while leaving the illumination of the soil unaltered.—Tocklai exp. Stat., Assam.

2999. ROGERS, T. E.
Overhead sprinklers. Results of Assam experiments.
Plant. Chron., 1959, **54**: 265-6.

See *H.A.*, 29: 4113.

3000. D[UTTA], S. K., AND G[LOVER], P. M.
Pruning of young tea (Assam kinds).
Ser. Tea Res. Inst. Tocklai **10**/3, revised 1959, pp. 5.

Detailed recommendations for the nursery, at establishment and during the first 6 years.

3001. DŽANAŠIJA, A.
Dates for hedge pruning tea plantations. [Azerbajdžan.]
Azerb. Sos. Kend Teserrufaty, 1957, No. 2, pp. 25-31, from *Ref. Ž.* (*Biol.*), 1958, No. 17, Abstr. 77,887.

Owing to the irregular distribution of rainfall in Azerbajdžan the growth of tea is uneven; most of the leaves are plucked in May and by August the crop peters out. In pruning experiments it was found that hedge pruning in alternate years on March 15 was better than annual pruning on March 15, April 1, June 5, July 5 or August 5. With alternate-year pruning yields in the intermediate years were increased by 20–30%, plucking started 7–8 days earlier (thus spreading the work better) and quality was improved.

3002. VORONCOV, V. V.
Concerning the root hairs and mycorrhiza of tea plants. [Russian.]
Agrobiologija, 1959, No. 4, pp. 626-8.

Roots of tea plants with ectotrophic mycorrhiza were shown to have only few root hairs. Hyphae spreading between and penetrating into some cells were noted, some branches bearing spherical vesicles 20–40μ in diameter. Hyphae similar in colour and 6-8μ in diameter were found in soil under the tea bushes but were not found in soil away from the bushes.

3003. VISSER, T., SHANMUGANATHAN, N., AND MULDER, D.
The possibility of timing blister blight spraying according to sunshine records.
Tea Quart., 1959, **30**: 39-43, bibl. 3.

A short account is given of a spray-timing system, n which spraying is discontinued after a 5-day period during which sunshine exceeds 3¾ hours daily and resumed when sunshine drops below this level. The system gave adequate protection while reducing the number of spraying rounds by about 40% over a period of 8 months.

3004. VISSER, T., AND VYTHILINGAM, M. K.
The effect of marigolds and some other crops on the *Pratylenchus* and *Meloidogyne* populations in tea soil.
Tea Quart., 1959, **30**: 30-8, bibl. 9, illus.

n small-scale and field experiments the cultivation of *Tagetes patula* and *T. erecta* resulted in considerable decreases in the soil populations of meadow eelworm (*P. coffeae*) and root-knot eelworm (*M. javanica*), reducing the numbers more quickly and effectively than fallowing. As a cover crop marigolds also markedly decreased meadow eelworm infestation of tea roots. Bush types of marigold were preferable to dwarf forms. It is not expected, however, that marigolds can be generally grown as a cover crop in mature tea after pruning unless there are many gaps, because the period between pruning and recovery is normally too short for their establishment, but their cultivation as a pre-crop or cover crop in young tea is feasible. *Crotalaria usaramoensis* and *C. anagyroides* depressed the soil populations of both eelworms; *Tripsacum laxum* reduced meadow eelworm, but *Tephrosia vogelii* increased the populations of both.

3005. DAS, G. M.
Observations on the association of ants with coccids of tea.
Bull. ent. Res., 1959, **50**: 437-48, bibl. 24, illus.

In Assam and W. Bengal.

3006. ZAPROMETOV, M. N.
The ability to split the benzene ring in higher plants. Deep oxidation of C^{14}-catechins in tea shoots. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1959, **125**: 1359-62, bibl. 16.

3007. SARKAR, S. R.
Caffeine and tannin content of stalky tea.
Curr. Sci., 1959, **28**: 366-7, bibl. 5.

With increasing crude fibre values, the tannin content decreased slightly but that of caffeine remained the same.

3008. KEEGEL, E. L.
Tea manufacture in Ceylon.
Monogr. Tea Res. Inst. Ceylon **4**, second revised edition 1958, 10 × 6 in., pp. 179, bibl. 5 pp., illus., Rs. 7/50.

The first edition of this useful manual was reviewed in *H.A.*, 27: 971. Since its publication in 1956 more knowledge has been gained on certain aspects of rolling and fermentation, and this has been incorporated in the new monograph. Additional information on a new type of roller cone, a glossary of tea-tasters' terms and a set of specimen factory record sheets enhance its usefulness. There is a good index and a lengthy bibliography.

Sundry crops.

3009. LEDIN, R. B.
The Barbados or West Indian cherry.
Bull. Fla agric. Exp. Stats **594**, 1958, pp. 28, bibl. 40, illus.

Malpighia glabra is attracting increasing commercial interest owing to its exceptionally high ascorbic acid content of 1,000–4,676 mg./100 g. Following a description of the tree and its fruit, details are given of the soils required, propagation, planting, mulching, manuring, irrigation, pruning and pests. Yields as high as 171 lb. of fresh fruit per tree, i.e. nearly 26 tons per acre, have been obtained at the Subtropical Experiment Station. [For an outstanding variety, see *H.A.*, 28: 954.]

3010. (Puerto Rico University Agricultural Experiment Station.)
Garden cherry cultivation [in Puerto Rico].
Fmr Jamaica, 1959, **63**: 222-6.

Notes on growing *Malpighia glabra.*

3011. Anon.
[Solar drier for cloves.]
E. Afr. Fmr Plant., 1959, **3**(7): 40, illus., from *Agric. hort. Engng Abstr.*, 1959, **10**: 184.

An experimental unit for drying cloves, having an average heat input of about 3 KWH and consisting of an 81 sq. ft. wood frame hut with a 250 gauge polythene sheeting roof. Internal temperatures average 150–155° F.; 2 air changes an hour are possible, air intake being by natural leakage, but humidity is controlled by a ventilator. —E. Afr. industr. Res. Org.

3012. Singh, S. N.
Propagation of custard apple in Uttar Pradesh.
Sci. and Cult., 1959, **25**: 78-9, bibl. 3, illus.

Inarching 3 varieties of *Annona squamosa* on *A. reticulata* was most successful in August, the take being 100% with Saharanpur Local and Mammoth and 93·3% with Balanagar. The percentages of successful inarches with other species on the same rootstock were 93·3 for *A. cherimola*, 80 for *A. atemoya* and 66·6 for *A. glabra.*—Hort. Res. Inst., Saharanpur.

3013. Tropical Products Institute.
Kola nuts.
Trop. Sci., 1959, **1**: 112-14, bibl. 3.

A concise review covering species, and processing and composition of the nuts.

3014. Ezhuthachan, P. C.
The oysternut on the Anamallais.
Plant. Chron., 1959, **44**: 298-9, bibl. 1, illus.

A short account of growing *Telfairia pedata* introduced from central Africa.

3015. Bajpai, P. N.
Blossom biology and fruit set in *Phyllanthus emblica* L.
Indian J. Hort., 1957, **14**: 99-102, bibl. 1, illus., [received 1959].

The male to female ratio averaged 1,773·5 : 1. Stigmas were receptive for nearly 6 days. Although the initial fruit set was about 12·3%, subsequent fruit drop was heavy.—Agric. Coll., Kanpur, U.P.

NOTES ON BOOKS AND REPORTS.

Books.

(*See also* 2377, 3008.)

3016. Atkinson, J. D., and others.
Plant protection in New Zealand.
Govt Printer, Wellington, 1956, 10 × 6½ in., pp. 699, bibls, illus., 56s.

The use of the term "Plant protection" instead of the more modern "Crop protection" is fully justified, because this compendium is concerned entirely with cultivated plants in their growing environment, and does not include storage problems except in one section concerned with fumigation. The approach is *via* the causative agent, so that the first five parts are concerned with fungus diseases (60 pp.), bacterial diseases (33 pp.), virus diseases (73 pp.), physiological diseases (30 pp.), and insect pests, including other invertebrate pests (272 pp.); all these are compiled by experts in the New Zealand D.S.I.R. The other two parts are concerned with the chemicals used in plant protection (74 pp.) and fumigation and soil and seed disinfection (64 pp.), both by H. Jacks of the D.S.I.R., assisted in part by G. G. Taylor of the Fruitgrowers' Chemical Co., Nelson. Three appendices deal with spray programmes, incompatibility and certification (approval) of spray chemicals (the approval list for 1955 is given in full), and provide a guide to some 90 active ingredients used for the control of plant pests and diseases in New Zealand. There is also a glossary of some 200 terms used elsewhere in the book.

It is impossible for a single reviewer to evaluate all the contributions, but the present reviewer could find little fault with Part 6, "The chemicals used in plant protection". Chemically, it is unwise to use the term "carbamates" to cover the class of fungicides derived from dithiocarbamic acid, as the term also includes the insecticide "Sevin", which appears to have an entirely different mode of action. The common name "glyodin" does not, unfortunately, apply to the free base, but has been pre-empted for the acetate, and the full chemical name given for "captan" is no longer that used by chemists. Although these and other common names adopted in Great Britain and in North America are freely used, there is no reference to the methods by which such names are selected and recommended; some of these names are misspelt (chlorfenson, chlorbenside). The appendices giving names, properties, and uses of active ingredients would be improved by the use of structural formulae, which give so much more information about relationships than do the empirical formulae used.

The paper and print are excellent and so are the many drawings, but some of the photographs lack definition. A very similar book for British use could be compiled from the advisory leaflets published by the Ministry of Agriculture, Food and Fisheries, but the book under review will provide an invaluable reference and background source, concerning New Zealand conditions and practices, for crop protection workers all over the world.

A.H.M.K.

3017. Avery, A. G., Satina, S., and Rietsema, J.
Blakeslee: the genus Datura.
Ronald Press Co., New York, 1959, 9 × 6 in., pp. xli + 289, bibls, illus., $8.75.

The thornapple (*Datura stramonium*) has been much written about in the popular press during recent months. It appears as an alien weed in Britain, spasmodically, but with greater frequency in the southern parts. The hot dry summer favoured it and many specimens were sent to Kew for determination. Certainly it is a very poisonous plant but not one with either vegetative or reproductive parts such as would tempt even children to eat it. For this reason it is not so potentially dangerous as the native deadly nightshade (*Atropa belladonna*).

The thornapple has proved to be a most important subject for cytogenetical research, thanks to the insight of the late A. F. Blakeslee (1874–1954) and the devoted work of a team of eminent botanists who carried on investigations at the Connecticut Agricultural College at Cold Spring Harbor, and at Smith College Genetics Experimental Station, Massachusetts. The volume here under notice is to the memory of Albert Francis Blakeslee by a number of his colleagues and is a most useful summary of the researches on *Datura stramonium* and the nine other herbaceous species of the genus. In a series of fifteen chapters there are given a historical review of the *Datura* work, an account of the taxonomy of the species used, a summary of what is known about the alkaloids n the genus, details regarding the cytology (chromosome number and morphology, polyploidy, extra chromosomal types), the occurrence of chimaeras and gene mutations with an outline of radiation experiments, accounts of development, of segmental interchanges, and of barriers to crossability. The book is well produced and has many excellent illustrations.

t is impossible here to do more than note some of he more important results which were published n a very large number of papers from 1916 to 1956. The following is a very condensed selection from he chapters, by a number of authors, in this mportant book.

The genetic contributions of entire chromosomes, or large pieces of chromosomes became apparent with the discovery of trisomics in *D. stramonium*. The normal diploid has 12 pairs (2n) of chromosomes, but in 1915 there appeared a plant, with aberrant characters, that was later shown to be trisomic with 2n + 1 chromosomes. Since then all 12 possible trisomics have been found, for the extra chromosome may be homologous with any of the normal twelve kinds. Further chromosome variations were later found, as where the extra chromosome was a reduplicated half of one of the normal ones or where the extra chromosome was made up of parts of two non-homologous chromosomes. There were also compensating types, where one member of a normal pair was missing, but the deficiency was made up by having the two halves of this chromosome attached to two others. It is fortunate that the chromosomes in *Datura stramonium* can be distinguished one from another by different sizes and morphological characters. The first polyploid (a tetraploid) in the species was found in 1916. Later, there was discovered a haploid plant, that is a plant with only 12 chromosomes in all its parts. This was the first haploid found among vascular plants. It was almost sterile but very occasional formation of gametes with a full set of chromosomes enabled a completely homozygous diploid to be produced. The use of colchicine led to the appearance of many polyploids and plants in the series 1n, 2n, 3n, 4n, 6n and 8n are now known.

Studies of trisomics and other aberrants led to the concept of genic balance. In some trisomics it was found that some chromosomes were joined in circles of four. This was a result of reciprocal translocation that had taken place between non-homologous chromosomes. In *Datura* too were obtained the first mutations induced by the use of radiation. Later X-rays and thermal neutrons were used. It was also found that there was an increase in mutations the longer seeds were stored. Studies on pollen-tube growth in part explained some forms of non-crossability. Sometimes pollen tubes burst in the style. With slow growing pollen tubes, fertilization would result when the upper part of the style was cut off and spliced to the tip of the ovary. The first sectorial chimaera in *Datura* was observed in 1922, and many have now been obtained after experimental treatment with colchicine, etc., and have been examined in detail.

Enough has perhaps been outlined above to indicate the importance of the researches on *Datura* carried out by Blakeslee and his associates. The volume now published is a worthy memorial to an original investigator and one that should be read by all interested in modern botanical research, both for its special contents and even more because it illustrates the value of concentrating on one species and its allies from as many standpoints as possible.

The result is a synthetic study, in which results obtained by one specialist are frequently illuminated by those obtained by another.

W.B.T.

3018. Backeberg, C.
Die Cactaceae—Handbuch der Kakteenkunde. **(The Cactaceae—Handbook of cactus information. Vols I, II and III.)**
G. Fischer, Jena, 9½ × 7 in., in 6 vols; Vol. I, 1958, pp. 638; Vols II and III, 1959, pp. 639-1360 and 1361-1926, all illus., DM. 74, 87 and 85.

There must be few plant families more racked by controversy today than the Cactaceae. The reasons are not far to see. Succulents have attained widespread popularity as novelty sill and glasshouse ornamentals with a large and almost exclusively amateur following. Their peculiar morphology and physiology is associated with specialized environments, localization and parallel evolution on a grand scale. This presents great difficulty to the taxonomist, who has often relied on transient and vegetative characteristics in founding genera, and is further hampered by the inadequacy of herbarium material. Adherents of the "splitting" and "lumping" schools continue to wage war bitterly, and new systems are born overnight. Since the solidly conservative treatment of Karl Schumann (1898–1903) we have had the great monograph of Britton and Rose (1919–23), which took a broad concept of species and a narrow view of genera, which were increased in number from about 21 to 124. This was regarded with horror by adherents of the "lumping" school and took some years to gain general acceptance, by which time the interest it had stimulated led to the introduction of countless new plants. Further systems, more or less based on that of Britton and Rose, have been offered by Backeberg, Berger, Buxbaum, Kreuzinger, Marshall, Vaupel and others. Now, after a period of 35 years, we have a complete new monograph by Curt Backeberg: the climax of thirty years' work involving field trips to North and South America and a bigger publication record than any previous student of cacti.

The Backeberg system is based on the concept of independent evolution from a common point of origin in Tropical America, the North and South lines of descent being treated separately and calling for separate generic names, now increased in number to 221. Of the three volumes to appear so far, the first covers the introductory chapters and the subfamilies *Pereskioideae* and *Opuntioideae*; the second and third the South American *Cereoideae*. Vols 4 and 5 promise the North American *Cereoideae* and a sixth concludes the work with a general index, a survey of hybrid cacti and other supplements. By its sheer bulk and extent of industry "Die Cactaceae" commands respect and will remain a reference work for some time to come, even though its German text at present limits universal acceptance. Certainly it will not stereotype cactus taxonomy: the opposition are already manning their guns and have begun demolition. Nor will the nomenclature remain free from reproach: a high percentage of the names in current use are still, technically, nomina nuda, cultivars, or species very fragmentarily described. This is because seed of novelties reaches the nurserymen and distributors so fast nowadays that much of it is put out under provisional names rather than collectors' numbers, which discourage buyers. It takes many years' study of living, flowering-size specimens to assess their status, and the incentive to rush into print and secure priority of naming is frustrating to more thorough workers. The name finally accepted is thus often the least suitable and worst founded: a basic fault of our system grounded on strict priority and "winner-takes-all" tactics.

In presentation "Die Cactaceae" is easy to handle and attractive to read, with copious illustrations from black-and-white and coloured photographs. Of great value are the keys to genera, species and varieties. References are cited to basonyms and important synonyms, but long lists of unimportant synonyms merely duplicating Britton and Rose's work are wisely omitted. A criticism must be made of the placing of the illustrations which are often some pages behind or ahead of the text, a situation made even more tiresome by the grouping together of additional plates at the end of each volume. Obviously the publishers are not practising botanists! But, in all, this is a great achievement, produced at a time of flux when few would have thought a monograph possible at all. Meanwhile, much long-term work goes on: the Hutchison-Kimnach team in California, Norman Boke on anatomy, Franz Buxbaum on physiology and systematics, Rauh and Ritter in the field and countless specialists grinding away at their own smaller fields of research. "Die Cactaceae" presents us with a large, fine grained photograph of the situation today: a situation full of activity and controversy, method and madness.

G.D.R.

3019. Bentley, M.
Commercial hydroponics: facts and figures.
Bendon Books, Johannesburg, 1959, 10½ × 7½ in., pp. 750, bibls, illus., £15 15s.

In 1955 Dr. Maxwell Bentley published "Growing plants without soil (vermiculaponics)", which was reviewed in *H.A.*, 28: 3179. This earlier book, which was largely based on the author's own extensive experience in South Africa with the culture of many vegetable and flower crops in vermiculite, has been largely absorbed—perhaps engulfed would be a better word—in this much larger and altogether more ambitious publication.

Most of the information given in the first book is repeated here, either unchanged or modified or extended only slightly. New features include a survey of world installations, among which are the impressive Robins Farms on rainless Aruba that are served by a sea-water distillation plant with a daily output of 10,000 tons, and chapters devoted to glass and plastic houses and the layout and construction of various types of bed. In addition, the range of crops covered has been extended beyond vegetables and flowers to include essential oils, drugs and herbs. A chapter has also been added on the packing, or to be more accurate the packaging, and marketing of crops.

"This book has not been written as a learned technical work, but as a guide to the many people who are interested in the future of hydroponics on a commercial scale." In these words Dr. Bentley opens his Introduction, and thereafter proceeds to maintain a clear and simple style throughout. It is true that in his very evident enthusiasm for his subject he has tended here and there to repeat himself, but for the uninitiated repetition is much to be preferred to the opposite approach in which an author assumes that much basic information can be taken for granted. It is also evident that, although Dr. Bentley is an enthusiast, he has managed to keep both feet firmly on the ground. Thus he devotes considerable attention to the economic aspects of hydroponics in comparison with those of soil culture by traditional methods. In regions with good soil and climatic conditions the development of hydroponics may be limited to certain high-priced crops such as the glasshouse carnation. It is in regions with poor soils and low rainfall, and especially those that are ill-served by transport from more favoured areas, that methods of soilless culture have made, and are likely in future to make, the biggest strides.

The capital outlay needed to install a hydroponic unit is very high. Dr. Bentley mentions a figure of £6,000 per acre. Against expenditure of this magnitude the price of this book, 15 guineas, may not seem unduly high. It is in fact a de luxe edition of only 1,000 copies. The whole book is printed on heavy art paper and weighs no less than 7 lb. The print is large and exceptionally clear, and there are numerous photographs, more than 50 of them in colour. It is not surprising to hear that the demand for the book has exceeded all expectation. Presumably this will result in a second printing being undertaken in the near future. G.K.A.

3020. BRACHET, J., AND MIRSKY, A. E. (EDITORS).
The cell. Vol. 1.
Academic Press, New York and London, 1959, 9½ × 6½ in., pp. 816, bibls extensive, illus., 157s. 6d.

This is the first of three volumes to be devoted to cell biochemistry, physiology and morphology. This volume deals with methods of study and problems of cell biology and comprises fifteen comprehensive reviews. The second and third volumes are intended to cover cell constituents and specialized cells respectively.

3021. COSTE, R.
Les caféiers et les cafés dans le monde. Tome second. Les cafés. Volume 1. **(The coffee trees and coffees of the world. Second part. The coffees. Vol. 1.)**
Éditions Larose, Paris, 1959, 11 × 9 in., pp. 372, bibls extensive, illus., paper bound 16,500 fr., cloth bound 19,500 fr., both plus 330 fr. postage.

The first part of this work, that dealing with coffee trees, appeared in 1955 and was reviewed in *H.A.*, 26: 4257. This present book contains the first 12 chapters of the second part, dealing with the coffees of the world, and the second volume comprising chapters 13 and 14 and annexures is expected to be published in the near future.

This volume opens with details of the manufacture, standardization and characteristics of raw coffee and then passes on to its roasting and preparation and matters pertaining to flavour and quality. The chemistry of coffee is then dealt with in considerable detail, and chapters are devoted to soluble coffee and "de-caffeined" coffee. Finally commerce and legislation are adequately covered.

In writing this important volume the author, who is the Director General of the French Coffee and Cacao Institute, has had the assistance of MM. H. Cambrony, P. Navellier and H. Rabéchault, each an authority in his field, and their collaboration has resulted in a manual which in respect of coverage, detailed thoroughness and presentation cannot be criticized. The book is well printed, the illustrations are numerous and clear and the bibliographies are lengthy and by no means restricted to French or even European authorship. The whole work is clearly of major importance to coffee producers, manufacturers and merchants throughout the world. G.E.T.

3022. EXELL, A. W., AND WILD, H. (EDITORS).
Flora zambesiaca. Vol. 1, Part I.
Crown Agents, London, 1960, 9½ × 6 in., pp. 336, illus., map, 25s.

This flora of Mozambique, the Rhodesias and Nyasaland, and Bechuanaland results from collaboration between the Governments of the Federation of Rhodesia and Nyasaland, Portugal and the United Kingdom and between botanists and institutions in these countries. It is written in English, except for the preface and introduction which are also in Portuguese, and this first part of the first volume covers the Gymnospermae and 17 families of the Angiospermae from Ranunculaceae to Polygalaceae in the sequence of Bentham and Hooker. It is well printed and illustrated with clear line drawings.

3023. Franklin, M. T., and Hooper, D. J.
Plants recorded as resistant to root-knot nematodes (*Meloidogyne* spp.).
Tech. Commun. Commonw. Bur. Helminth., St. Albans **31**, 1959, pp. 33, bibl. 5 pp., 7s. 6d.

Listed alphabetically, and by families under the various species of *Meloidogyne*.

3024. Harley, J. L.
The biology of mycorrhiza.
Leonard Hill, London, 1959, 10 × 6 in., pp. xiv + 233, bibl. 18 pp., illus., 55s.

Since Dr. Rayner published her book on mycorrhiza in 1927 there has not been a comprehensive account of this subject, although the need for a critical re-appraisal of the extensive literature dealing with mycorrhizal associations has been evident for some time. Dr. Harley has undertaken the task of trying to sort out the experimentally established facts from a good deal of conjecture and conflicting evidence.

About half the book is devoted to ectotrophic mycorrhiza, their structure and development, their physiology with special reference to respiration and salt uptake, and the identity, growth requirements and physiological characteristics of their fungal components. Not only is this the most advanced field of mycorrhizal studies, but the author has himself been intimately associated with it and has produced an admirable and most interesting account of the present state of knowledge in this field. Although this is primarily an account of physiological studies carried out on detached roots or on plants raised aseptically, such investigations are a necessary first step, and in a chapter on the ecology of ectotrophic mycorrhiza the author courageously faces the question of their possible significance in tree growth. Increase in surface area of the infected root system, avidity and selectivity of mycorrhiza for certain nutrients and the ability to translocate these to the host are experimentally verified functions which may be of importance.

The remainder of the book deals with the endotrophic mycorrhiza of the orchids and the Ericales and with the vesicular-arbuscular infections found in so many annual and perennial plants. Once again it is pointed out that the mycorrhizal state is the normal condition of the absorbing roots of most plants grown under natural conditions, but knowledge about its effect on root metabolism, or its mechanism of action in cases where an effect can be clearly demonstrated (as in the early growth of orchid seedlings) remains incomplete. Some recent advances in the identification and isolation of the fungi causing vesicular-arbuscular mycorrhiza are discussed.

In spite of its clear arrangement and easy style the book is hardly intended for the horticulturist looking for a clear-cut answer on practical issues. Soil microbiologists and plant physiologists will find in this book much to stimulate their interest, and those with a special concern in mycorrhizal associations will be grateful for this authoritative account of a complex problem. B.M.

3025. Heinze, K.
Phytopathogene Viren und ihre Überträger. **(Phytopathogenic viruses and their vectors.)**
Duncker and Humblot, Berlin, München, 1959, 9½ × 6½ in., pp. 291, bibl. extensive, DM. 48.

This book is a catalogue of plant virus diseases and their reported vectors compiled from a comprehensive survey of the literature.

Starting with a discussion of virus-vector relationships there follows a section in which viruses are listed under plant families. The main part consists of a vector list, grouped according to the normal zoological classification, containing the names and distribution of vectors, viruses transmitted, transmission period if known, and references. Separate alphabetical indices to vectors and viruses are appended to simplify the use of these lists.

By including both German and English names for each virus the author has produced a well documented reference book, which will prove extremely useful to a large number of workers in this field.
G.H.L.D.

3026. International Potash Institute.
Japanese potassium symposium. Nine papers read at the first Japanese Potassium Congress, Tokyo, 1957. [In English.]
International Potash Institute, Berne, [1959?], 8½ × 6 in., pp. 137, bibls, illus.

Papers on the K nutrition of citrus and tobacco are abstracted separately.

3027. International Potash Institute.
Potassium symposium, 1958.
International Potash Institute, Berne, [1959?], 9 × 6 in., pp. 426, bibls, illus., Fr. (Swiss) 19 or $4.50 (subscription rate Fr. 14.50 or $3.50).

The symposium comprises papers read at the 5th Congress of the Institute (held in Madrid in 1958) concerning K nutrition in relation to soils and water supply, contributed from Spain, Portugal, Germany, Great Britain, Israel, Japan, France, Italy and Belgium, and referring to temperate, subtropical and tropical crops. The introduction and final address are in Spanish, German, English and French, and each paper is in one of these languages, having, with few exceptions, summaries in the other 3. Papers on sugar cane and hevea are noted separately.

3028. Istituto di Frutticultura e di Elettrogenetica, Roma. (Pirovano, A.)
Elettrogenetica. Esperimenti su vegetali. **(Electrogenetics. Experiments with plants.)**
Istituto di Frutticultura e di Elettrogenetica, Rome, 1957, 10½ × 7½ in., pp. 147, bibl. 45, illus.

To commemorate the 30th anniversary of its foundation, the Institute of Fruit-growing and Electrogenetics in Rome has published this book, illustrated in half-tone and in colour, describing the effects of electromagnetic forces on living cells, plant organs, and particularly on somatic and gametic chromosomes. Practical applications of this work are discussed with reference to the breeding of fruit, vegetable and ornamental plants.

3029. La Porte, J.
Semillas y plántulas de las cruciferas cultivadas en la Argentina. **(Seeds and seedlings of cruciferous plants cultivated in Argentina.)**
Universidad de Buenos Aires, 1959, 9½ × 6 in., pp. 141, bibl. 25, illus.

Some 50 species of Cruciferae are cultivated in Argentina. The object of this well-illustrated book is to make possible the identification of these from seeds or seedlings. Among the plants described are *Isatis tinctoria*, *Brassica alba*, *B. nigra*, and ornamentals of 10 genera including *Matthiola*, *Alyssum*, *Aubretia*, *Iberis*, *Cheiranthus* and *Arabis*.

3030. Li, H. L.
The garden flowers of China.
Ronald Press Co., New York (Chronica Botanica ser. No. 19), 1959, 9 × 6 in., pp. vi + 240, bibls, illus., $6.50.

It is not common to find so graceful a blending of the scientific with the aesthetic as this book presents. The author and the publishers are to be congratulated on an excellent production, in which legend, history, botany, art and horticultural science intermingle, in language that has a natural dignity, and with illustrations that are exquisite. The introductory chapters, "China, mother of gardens", and "A historical sketch of Chinese horticultural literature", are followed by chapters on each of the principal indigenous species or genera, and on exotic flowers and recent introductions. Each chapter has a separate bibliography. The appendix consists of a table of Chinese dynasties, beginning at 2205 B.C., an additional bibliography of more general reference books, and another of many Chinese horticultural writings produced before 1850, as well as an index of Chinese plant names and a general index. The half-tone plates are from pottery, ink paintings on paper, and colour paintings on silk, and if the book has any shortcoming, it is that these last cry out for reproduction in colour. The line drawings, particularly those executed with forthright brush strokes, are more full of character than those of most Western flower artists. K.H.C.

3031. Spice, H. R.
Polythene film in horticulture.
Faber and Faber, London, 1959, 9 × 6 in., pp. 176, bibls, illus., 18s.

The uses for this comparatively new material seem to be innumerable and among those of special interest to the grower of plants are its possibilities as a conserver of heat in glasshouses and as an inexpensive alternative to glass in greenhouses, frames and cloches. The ventilation and distribution of warmed air in greenhouses and mushroom houses by means of polythene tubing is another fairly recent application, but in view of the cheapness and efficiency of this system it is certain to become more widespread in the future. Sufficient detail is given in this book to enable those who have not yet used plastic film in any of its many capacities to do so with every chance of success.

This comprehensive and knowledgeable survey of the uses of plastic film in horticulture can be confidently recommended to those interested in plant growth and crop production. The book is well produced and contains numerous clear illustrations and short but useful lists of references for further reading after each chapter. M.M.M.

3032. Thorne, T.
Fuchsias for all purposes.
Collingridge, London, 1959, 9 × 6 in., pp. 175, illus., 30s.

The important feature of this book is the check list of species, hybrids and varieties of fuchsias in cultivation. It is claimed to be the only up-to-date and fully comprehensive published list in existence. If length proves anything this is probably true. There are 96 pages of it. Much work has gone into its compilation. Names, colours (checked with the R.H.S. chart), dates of introduction and names of hybridizers are given and a symbol indicating degree of hardiness is added. Some years ago interest in the fuchsia had so declined that many hundreds of old varieties were believed to have been lost to cultivation. The plant has since staged a come-back with a success that waning stars in other fields might envy. The author himself has retrieved and reintroduced some 800 of the lost ones.

The British and American Fuchsia Societies are flourishing with ever lengthening membership lists and, most significant, a number of firms are now specializing in fuchsias alone or are issuing catalogues devoted entirely to this plant. Thus it is that Mr. Thorne, who, following parental and grand-parental footsteps, began "fiddling about" with fuchsias at the age of 6 and has never left off, has produced his book at a time when something of this sort was particularly needed. The first part of the book is a concise but complete guide to cultivation from seed or cutting to show bench. Quite often the author has put forward ideas of his own differing from accepted practice, advising sceptics to try both ways and keep an open mind. There are a number of good illustrations, which, except for the frontispiece, are not in colour and are mostly used to demonstrate habits of growth, methods of training and varieties with unusual or striking flower forms. The book will obviously be a success. G.St.C.F.

Annuals and reports.

(*See also* 2805, 2824, 2846, 2925, 2939.)

3033. Agricultural Improvement Council for England and Wales.
Fourth Report 1956-59, H.M.S.O., London, 1959, pp. 27, 2s. 6d.

This report briefly outlines the broad pattern of experimental work, including horticulture, in England and Wales, with reference to the N.A.A.S. stations, the various research stations and the chief problems under investigation.

3034. Alberta University, Canada Department of Agriculture and Alberta Department of Agriculture.
Alberta Farm Guide, 1959.
Alberta Dep. Agric. Ext. Serv., 1959, pp. 200, bibls, illus.

This publication provides advice and information on many agricultural subjects for farmers. The section on horticulture deals with fruit tree planting and pruning, shelterbelts, windbreaks, small fruits and vegetables.

3035. Anon.
Where to buy everything for agriculture and horticulture. No. 10. 1959-60.
"Where to Buy" Ltd., John Adam House, 17-19 John Adam Street, London, W.C.2, 1959, pp. 156, 5s. + 8d. postage.

For the scope of this annual directory, see *H.A.*, 29: 980.

3036. Brandon Experimental Farm, Manitoba.
Progress Report of the Experimental Farm, Brandon, Manitoba, 1953-1957, Canada Dep. Agric., Ottawa, 1959, pp. 67, illus.

This report includes an outline of: *Horticulture:* Tomato variety trials; treatment of pea seed with Ceresan for *Pythium* control; breeding work with two *Heuchera* spp. to develop a new ornamental. *Experimental Substation, Wabowden:* Vegetable tests under prairie conditions.

3037. British Columbia.
Fifty-third Annual Report of the Department of Agriculture, 1958, 1959, pp. 99.

Agricultural statistics for tree fruits, small fruits, vegetable crops and nursery stocks are the main items in the report of the Horticultural Branch. Diseases and pests are surveyed by the Plant Pathology and Entomology Branches.

3038. California.
Thirty-ninth Annual Report of the State of California Department of Agriculture, period ending December 31, 1958.
Bull. Calif. Dep. Agric., 1959, **48**: 38-159, illus.

Horticultural crops feature briefly in reports from the Bureaux of Entomology and Plant Pathology.

3039. Colonial Pesticides Research Unit, Arusha.
Annual Report of the Colonial Pesticides Research Unit, Arusha, Tanganyika, for 1958-1959, Dar es Salaam, 1959, pp. 28, illus., 5s., being *Progr. Rep.* **24**.

Progress is described on the following subjects: *Pseudotheraptus wayi* control on coconuts; the persistence of a copper fungicide on coffee leaves; electrostatic dusting of coffee trees; black pod (*Phytophthora palmivora*) control on cacao; the susceptibility of *Grevillea robusta* roots to *Armillaria mellea* in tea plantations following the killing of the trees by herbicides; herbicidal control of prickly pear, *Digitaria scalarum* and *Cynodon dactylon* in coffee, *Pennisetum clandestinum*, weeds in French beans and pyrethrum, *Cyperus* spp., tuberous rooted *Oxalis* spp. and *Salvinia auriculata*.

3040. Colonial Pesticides Research Unit, Arusha.
Interim Report of the Colonial Pesticides Research Unit, Arusha, Tanganyika, for April, 1959 to Sept., 1959, 1959, pp. 16, being *Progr. Rep.* **25**.

In experiments on the control of *Pseudotheraptus* on coconuts sprayed palms yielded 40% more nuts but, having borne this heavier crop, are now flowering at a lower rate than the controls. Clean cultivation, undertaken to facilitate recording, has increased yields, and it is suggested that proper cultivation may be a better economic proposition than *Pseudotheraptus* control. In weed control experiments with beans DNBP, MCPB and simazine gave good results as pre-emergence sprays, but dinoseb applied post-emergence was phytotoxic.

3041. Colorado.
Seventieth Annual Report of the Colorado Agricultural Experiment Station, 1956-1957, pp. 16, illus.

The report includes brief mention of work in progress on pest control in fruit and tomato crops, onion breeding, air conditioning for rose and carnation glasshouses, turf irrigation, cover cropping for correction of chlorosis in orchard trees, peach variety trials, and control of diseases and weeds in various crops.

3042. C.S.I.R.O., AUSTRALIA.
Tenth Annual Report of the Commonwealth Scientific and Industrial Research Organization for the year 1957-58, Canberra, 1958, pp. 174, 14s.

Certain parts of this report have been abstracted separately, viz. Fruit investigations and Irrigation in the March number of *H.A.* [abstracts 121 and 335] and Tobacco investigations in this number [2378]. Other sections of the report containing items of horticultural interest include: *Plants:* Genetics; microbiology; plant physiology. *Entomology:* Ecology of orchard pests; biological control of weeds and pests. *Food:* Chemistry; fresh fruit and vegetable storage; dried vine fruits (commercial dips). *Atmospheric physics:* Cloud and rain physics.

3043. CYPRUS (RUCK, H. C., AND OTHERS).
Annual Report on Horticulture.
A.R. Dep. Agric. Cyprus for 1958, Annexure III, 1959, pp. 24.

Work in progress includes the following: Selection of peaches, apples and pears with low chilling requirements; trials of rootstocks, particularly for pears and apples; preliminary selection work on pistachios and carobs; in oranges, zinc deficiency and pre-harvest drop and the introduction of new varieties; importation of vine scion and rootstock material; production of out-of-season tomatoes and cucumbers under plastic covers.

3044. DIRECTIE VAN DE LANDBOUW, THE HAGUE.
Tuinbouwgids 1960. **(Horticultural guide for the Netherlands, 1960.)**
The Hague, Netherlands, 1959, 9 × 6 in., pp. 680, illus., fl. 8.50.

The lay-out and coverage of this valuable reference book for commercial horticulturists remains basically unchanged, with its sections on official institutions, legal matters, literature, measurements, weather, statistics, economics, techniques, soils, plant protection materials, articles on the culture of various crops, seeds, plant awards and the nutritional values of foodstuffs. A new range of subjects s covered in the cultural articles.

3045. EAST AFRICA HIGH COMMISSION.
Record of Research for the period 1st January to 31st December, 1958, being *A.R. E. Afr. Agric. For. Res. Org.*, Nairobi, pp. 109, bibls, Sh. 3/50.

Although most of the research reported is of a fundamental character, of direct horticultural nterest are sections on: Stem pitting condition in coffee, and Ratoon stunting disease of sugar cane, by F. M. L. Sheffield; and Plant nematology, by A. G. Whitehead, which examines the principal nematode troubles affecting East African crops.

3046. EAST AFRICAN INDUSTRIAL RESEARCH ORGANIZATION.
Annual Report of the East African Industrial Research Organization for 1958-1959, Nairobi, 1959, pp. 21, illus., Sh. 2.

Progress is reported on the following: mechanical drying of coffee [see abstract 2900]; mechanical shelling of cashew nuts and extraction of shell liquid; bromelain from pineapple stems; extraction of avocado pear oil; perfume production from *Jasminum grandiflora* by solvent extraction; utilization of waste fuels including coffee husks and coir dust; sisal leaf composition studies; chemistry of coffee liquors and the "onion" flavour.

3047. EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.
Report for the year ending 30th September, 1958, pp. 139.

Work noted in *H.A.*, 28: 3208 is being continued. Additional work reported includes: *Weed control:* Dowpon has proved suitable for couch grass control in raspberries and black currants. With raspberries spring applications may cause a growth check, which in vigorous varieties is slight but in Malling Jewel may be serious. PDU, CIPC and simazine have shown promise. *Fruit varieties:* Trials over 7 years have shown Malling Jewel to be the best raspberry and Wellington XXX the best black currant for the West Lothian area. *Effect of salt on beetroot:* No significant increase in root weight due to salt application was found when beetroot was harvested at the tender root stage, but it is suggested that salt may increase leafage and hence root yield if the crop is left to maturity. *Raspberry cane tipping:* No evidence was found that the time of tipping affects the time of flowering or growth of laterals, susceptibility to frost and die back or death of canes.

3048. FEDERATION OF RHODESIA AND NYASALAND.
Report of the Secretary to the Federal Ministry of Agriculture for the year ended 30th September, 1958, Salisbury, 1959, pp. 215, 10s. 6d.

Research work reported includes: *French beans:* Scab due to *Elsinoë phaseoli* f. sp. *vulgare* can be seed-borne, the fungus being carried within the testa as well as on the surface. In tests on 10 varieties for susceptibility to scab and anthracnose (*Colletotrichum lindemuthianum*) Wade and Selection 6–34–9 proved completely resistant to both diseases; Topcrop was resistant to anthracnose. Maneb, captan and thiram at 2 lb./100 gal. applied at 50% pod set gave better scab control than zineb or copper oxychloride. Maneb and zineb were better against anthracnose. *Apples:* Bordeaux at 4:6:50 reduced bitter rot from 18·3 to 0·7% but caused fruit and foliage injury; ferbam and maneb were less effective but showed no phytotoxicity. *Tomatoes:* Maneb at 0·2% gave the best control of late blight; 0·1% zineb plus 0·1% captan was also suitable. *Coffee seed viability:* For about 6 weeks after harvesting the seed remained dormant; germination then rapidly improved, remaining at a high level for 4 months, after which it rapidly declined until the seed became non-viable 9 months after harvest. *Herbicides:* November spraying with dalapon proved most effective for killing kikuyu grass between apple trees.

3049. FRIESDORF (MÖHRING, H. K.). *XXX. Tätigkeitsbericht 1958 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg.* **(30th Annual Report of the Horticultural Experiment Station at Friesdorf/Bad Godesberg for 1958,)** pp. 45, illus.

Trials were carried out on the use of mobile glasshouses for tulips, narcissi, chrysanthemums and stocks. Other experiments concerned the culture of *Ornithogalum thyrsoides,* sub-irrigation for *Asparagus sprengeri* and the economics of freesia culture. Variety trials were conducted with gladiolus and different types of chrysanthemum. The performance of sprinklers was greatly improved by the introduction of Danish nozzles dispensing very fine drops. In preliminary experiments with strawberries and chrysanthemums covering the soil with black plastic did not show any economic advantages. With hydrangeas, however, the technique saved labour by suppressing weeds. The use of hormone herbicides for weed control in flowers is discouraged, but BNP 30, which has a corrosive action on young weed leaves, is recommended for gladiolus and tulips under certain conditions. The rate of application suggested is 16 c.c. in 8 l. water per 100 sq. m. CIPC preparations were also useful, especially in closely planted fields.

3050. GEISENHEIM (STEINBERG, J.). *Hessiche Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau Geisenheim (Rheingau). Bericht für das Rechnungsjahr 1958/59.* **(Annual Report of the Hessian Horticultural College and Research Station at Geisenheim for 1958/59),** 1959, pp. 122, bibls.

Investigations reported include: *Department of botany, etc.:* Pollination by bees and cross pollination greatly increased the yields of 3 red currant varieties; with black currants pollination effects depended on variety; studies on iris flower pigments and a test for lycopene in flowers are also described. *Department of plant diseases:* Vines: Experiments on the control of peronospora, oidium and botrytis; chemicals with a fungistatic action on botrytis increased yields by 10–20% without reducing must quality. Fruit: *Ceratitis capitata,* apple mildew and *Stereum purpureum.* Ornamental plants: Isolations suggest that erica death is caused not only by *Pestalotia versicolor* but also by *Olpidium brassicae* and a *Phytophthora* sp. (*P. cactorum*?). Diseased or dead erica plants were frequently found to contain *P. versicolor* in their aerial parts and either of the other fungi in their roots. *Department of soils and plant nutrition:* Nutritional and other studies on *Erica gracilis*; mulching of cucumbers. *Department of vine breeding and propagation:* Rootstock responses to different soils; seedling selection; tests of French direct-producers; the rooting of one-bud cuttings from 30 rootstock varieties; rootstock-scion compatibility; the effect of N manuring on wood maturity in the rootstock nursery. *Department of viticulture and wine making:* Tasting panels agreed unanimously that generous N manuring improves wine quality, though a chemical basis for this conclusion is still lacking; calculations show that a correlation exists between grape yields and wood yields. *Department of fruit growing:* All the 10 apple varieties tested could be propagated by root cuttings, but success varied from 24·3% to 62·2%; shoots from 10–12-cm. root cuttings achieved a mean length of 25·2 cm. within the first year; the optimum diameter of the cutting is stated for 4 varieties. In addition to temperature rootstock vigour and scion quality affected success in walnut grafting; Esterházy I was added to the list of valuable walnut varieties. Annual thinning out of black currants led to a renewal of the fruiting wood and to an improvement of fruit quality, whereas cutting back caused fruit drop and too vigorous growth. *Department of horticulture:* Chrysanthemum varieties; softening the water for azaleas with oxalic acid (this did not injure the plants, but the process had no advantages over sulphuric acid which is cheaper); manuring of and media for azaleas; time of sowing snapdragons; begonia varieties; artificial illumination of *Sinningia speciosa.* *Department of vegetables:* Tomato and capsicum variety trials; glasshouse tomato seedlings raised in balata pots produced earlier yields and better fruit grades than the controls; cucumber plants raised in balata pots gave both earlier and higher total yields; in the case of lettuce small Jiffy pots were as good as clay pots of a larger size; infra-red radiation (Siccatherm lamps) proved eminently suitable as a source of heat for raising early vegetables; cucumber spacing; soil sterilization by steam and soil fumigation with Vapam and Larvacide for the control of cork root in glasshouse tomatoes; cultural measures which alleviate this disease and grafting on resistant rootstocks are also considered; electrical soil heating for chicory. *Department of experimental ecology of cultivated plants:* Tomatoes were used as test plants to demonstrate the growth-inhibiting effect of decomposing walnut catkins and leaves; the symptoms exhibited by tomatoes are described and a hypothesis is advanced on the nature and action of the inhibiting compounds involved. *Department of* *agricultural meteorology:* Injuries to vine leaves occurring in May due to intense insolation; relationships between the time of vine flowering and air temperature. Reports from the *Departments of garden design and management* are also included.

3051. GEMBLOUX.
Rapport général, Station de Recherches de l'État pour l'Amélioration des Plantes fruitières et maraîchères, 1958. **(General Report of the State Research Station for the Improvement of Fruit and Market Garden Crops, Gembloux, 1958)**, pp. 173.

Apple training: Effects of 5 intensive training ystems on yields of 13 varieties. *Fungicidal effects n apples:* Fruit colour and russeting in 2 varieties nfluenced by various fungicides and mixtures. *Veed control in apples:* Continuation of the previous ear's trials with 7 herbicides and various mixtures; ffects on specific weeds and on 4 apple varieties. *trawberries:* Selection of hybrids for virus esistance, yield, early ripening, resistance to ransport injury and to root diseases, and suitbility for processing; anti-virus thermotherapy; ata on flowering and fruit ripening for numerous arieties; responses to gibberellic acid (mainly e production of more and smaller fruits); earlier pening, but slightly lower yields under glass than nder plastic covers; earlier ripening, increased ields and excellent weed control with black lastic mulching. *Peas and beans:* Breeding and election; variety trials. *Tomatoes:* Breeding, election, and data on general disease resistance. *hicory:* Production of pure-line seed; manurial ials; propagation by root cuttings; forcing. *nions, spinach, cauliflowers, lettuces, celery:* reeding and selection. *Deep freezing:* Pea and rawberry varieties. *Grapes:* Cold storage of varieties, in which Muscat proved better than olman, Ribier or Royal, the method of moist unch stalks was as good as tray storage, 0·5° C. d 94% R.H. provided optimal conditions, and lphur dioxide was the best disinfectant.

052. GLASSHOUSE CROPS RESEARCH INSTITUTE.
Annual Report of the Glasshouse Crops Research Institute, Littlehampton, for 1958, 1959, pp. 93, bibls, illus., 10s.

e report is now in 3 parts, the first containing e introduction and an outline of the nursery d experiment station (pp. 9–18). Part II (pp. –58) is a general review of research work. ojects reported include: *Plant physiology*: Tomato owth analysis in relation to the time of year, and otchy ripening. *Chemistry:* Composition of mato fruit, including the effects of manurial atments and shading on composition, and rietal differences; manurial trials with glasshouse ops, including the effects of nutrient concentration liquid feeds on the yield and quality of tomatoes, g in tomato nutrition, carnation nutrition and the effects of soluble salts on mushroom growth and yield. *Crop protection:* Persistence of insecticides in mushroom composts, *Didymella* stem rot of tomato, and chemical control of red spider mites. *Plant breeding:* Tomato, cucumber and lettuce. *Entomology:* Ecology of the glasshouse white-fly, and studies on mushroom pests including phorids, sciarids and cecids. *Mycology and virology:* Effect of cultural conditions on *Didymella* stem rot; the host range of cucumber mildew; carnation diseases; and mushroom diseases of the "watery stipe" type. Part III (pp. 59-91) consists of special research reports and reviews, most of which are abstracted separately.

3053. HELLYER, A. G. L. (EDITOR).
Amateur Gardening Annual.
Amateur Gardening, Tavistock Street, London, W.C.2, 1959, pp. 136, illus., 6s.

This attractively produced and well illustrated annual contains nearly 50 short articles on a wide variety of gardening topics such as garden design, the culture of some of the more uncommon plants, new herbicides, grass cutting equipment, and the construction of a tool cupboard and a span-roof frame.

3054. INDONESIA.
Verslag over het jaar 1957 van het Proefstation der Centrale Proefstations Vereniging. **(Report for 1957 of the Experiment Station of the Central Union of Experiment Stations)**, 1958, pp. 130.

Experimental work on the following crops is summarized: *Rubber:* Testing clones and seedlings, tapping systems, planting density, manuring, latex stimulation, rootstocks, crown budding, disease resistance. *Tea:* Clone testing, propagation by cuttings, plucking, pruning, manuring, shading, drying, pests and diseases. *Coffee:* Drying and fermentation. *Cinchona:* Changes in moisture and alkaloid contents during transport. *Cacao:* Fermentation. *General studies:* Machinery, control of lalang, weed control in tea, chemical destruction of rubber trees, leaf analysis of tea and rubber.

3055. INSTITUTO INTERAMERICANO DE CIENCIAS AGRÍCOLAS, TURRIALBA, COSTA RICA.
Informe anual 1957-1958. (**(Annual Report of the Interamerican Institute of Agricultural Sciences 1957-1958)**, Turrialba, Costa Rica, pp. 48, illus.

In this report the section dealing with agronomy summarizes work in progress on the induction of mutations in coffee, cacao and other crops by gamma irradiation from radioactive cobalt, and on coffee nutrition, pruning and variety trials. Disease control in cacao is briefly mentioned. Information services and post-graduate courses are outlined.

3056. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarboek Tuinbouwtechniek 1959/1960. **(Yearbook of Horticultural Engineering, 1959/1960)**, Inst. Tuinbouwtech., Wageningen, 1959, pp. 304, illus., fl. 5.

Notes on the latest equipment, materials and methods in the field of horticultural engineering are presented, mainly in the form of summaries of articles published in various Dutch and foreign journals. The section headings are: glasshouse construction, heating and ventilation, electricity, tractors and machines, spraying and dusting, harvesting and grading, work methods, and miscellaneous.

3057. JOHN INNES.
49th Annual Report of John Innes Horticultural Institution, 1958, Bayfordbury, 1959, pp. 44, 3s.

Reports on research in progress include the following: *Plant breeding:* Scab and mildew resistance in the apple; pear-apple hybrids; treatments conducive to rapid terminal growth, which were found to shorten the period of juvenility in apple and pear seedlings; inbreeding in strawberries; testing for red core resistance in strawberry; apomixis in *Rubus*; tetraploid roses resulting from species crosses which were treated with colchicine; hybridization to elucidate the origin of garden roses; irradiation by injected P^{32}, which increased variability in inbred lines of tomato; hybrid vigour in tomatoes. *Genetics:* Self-incompatibility in the Solanaceae. *Plant cell biology:* The respective contributions of cell division and cell expansion towards the growth of a *Helianthus* leaf. *Physiology and plant culture:* Descriptions of the new growth rooms with special reference to light and temperature regulation; studies on tomatoes with particular reference to their early growth and development, the light/temperature regime in glasshouses and the air capacity of sand cultures. Tomatoes and snapdragons planted in a steam-sterilized boulder-clay loam containing 3–5% of free calcium carbonate suffered a severe check to their development; treatments in which 40% moss peat or 25% moss peat and 15% granite grit by volume were added to the loam showed no sign of a sterilizing check.

3058. JORDAN.
Seventh Annual Report of the Deir Alla Research Station for 1958, 1959, pp. 73.

Oil seeds: Castor bean strain No. 145-4 × 445 outyielded all others; 80 × 30 cm. was the best of 3 spacings used for castor and the best sowing time appeared to be from mid-December to mid-January in the Jordan Valley. Safflower variety ECR 1807 gave the highest number of "bolls" per plant, but ECR 1284 had the greatest oil percentage. The earliest sowing date tried, December 3, produced the heaviest crop. *Tomato trials:* Sioux proved the heaviest cropper; F.Y.M. proved better than super; transplanting in September and October proved better than transplanting in November. In another trial a spacing of 120 × 40 cm. gave double the yield of 120 × 80, superphosphates increased the crop by 30%, and staking reduced it by over 35%. In a year in which late blight (*Phytophthora infestans*) incidence was rather light Manzate and Parzate gave the best control.

3059. KATHERINE RESEARCH STATION, C.S.I.R.O.
Progress report 1946-56, Melbourne, 1959, pp. 60 + 5 plates, bibl. 19.

The Katherine Research Station, situated 200 miles inland from Darwin in the Northern Territory of Australia, was established to examine the possibility of developing agriculture in this region and to serve as a type location for studies on dryland agriculture in the monsoonal zone of northern Australia. In describing results obtained during the first 10 years it is emphasized that the main promise seems to lie in certain field and fodder crops and in the improvement of pastures. Other crops under investigation include tobacco [see abstract 2379], castor beans and safflower.

3060. LACOMBE EXPERIMENTAL FARM, ALBERTA.
Progress Report of the Experimental Farm Lacombe, Alberta, 1953-1957, 1959, pp. 43, illus.

Horticulture (pp. 30-4): Vegetable variety trials. Tomato breeding. Sowing tomatoes in the glasshouse on 5 April has given significantly higher yields of ripe fruit than sowing 10 days earlier or later. Spraying tomato blossoms with commercial hormone preparations under adverse weather conditions has not been successful. The following chemicals are recommended for weed control in vegetables: Varsol for carrots, 80 gal./acre applied at the second true-leaf stage; Dow-Selective (ammonium dinitro-*sec*-butylphenate 13·7%) for peas, 3 quarts in 100 gal./acre when the plants are 4 in. high; Aero Cyanamid Special Grade for onions, 100 lb./acre immediately after sowing, although the herbicide was only effective for 4 weeks; TCA for rutabagas [swedes], 40 lb./acre applied pre-emergence. Hardy varieties of tree and small fruits, fruit breeding, and variety trials with ornamentals are also described.

3061. LAUSANNE.
Stations fédérales d'essais agricoles de Mont-Calme et Montagibert, Lausanne et Pully. Rapport d'activité 1958. **(Annual Report for 1958 of the Swiss Agricultural Research Stations at Mont-Calme and Montagibert, Lausanne and Pully.)**
Landw. Jb. Schweiz., 1959, **8**: 439-657, bibls, illus.

In Part I current work on horticultural crops includes the following: *Plant improvement:* Tobacco responses to gibberellin; vine and top fruit varieties, rootstocks and cultural techniques; tomato variety and cultural trials; onion planting distances; the effect of gibberellin on beans and seed lettuce. *Plant pathology:* Control of white rot (*Coniella diplodiella*) of vines and San José scale; virus diseases of tobacco, pears and apricots; weed control in strawberries and onions; control of couch grass (*Agropyron* spp.). Part II contains original articles, some of which have been abstracted separately.

3062. LUDDINGTON (N.A.A.S.).
Report of the Luddington Experimental Horticulture Station, Stratford-on-Avon, Warwickshire, for 1958, 1959, pp. 99.

This report provides a catalogue of the experiments in progress, their design and treatments and, in some cases, tentative results. *Fruit section:* Apple mildew control; raspberry variety trial; control of red spider mite on black currants and of *Botrytis* fruit rot of strawberries; herbicide trials in strawberries. *Vegetable section:* N.I.A.B. variety trials on onions, carrots, brussels sprouts, spring cabbage, cauliflowers, red beets, green peas and runner and climbing French beans; club-root control in cabbage; rates of sowing and control of *Botrytis* in salad onions; asparagus spacing and strains; tainting of carrots by BHC and aldrin; top dressing summer cabbage; weed control in spring cabbage and broad beans; effect of stopping and spacing brussels sprouts; irrigation trials on cauliflowers, carrots, lettuces and celery; manurial and cultivation trials with vegetables. *Intensive cultivation section:* Self-blanching celery spacing and N levels and lifting dates; carrot varieties and sowing dates; marrow varieties and strains. *Glasshouse section:* Control of flowering by light and shade, direct planting, early flower production and observations on phytotoxicity of acaricides in chrysanthemums; effect of pot size and fertilizers on cyclamen. *Flower section: Botrytis* control and propagation of gerberas; early chrysanthemum propagation. *Meteorological experiments:* Shelter screens for lettuce.

3063. MINISTRY OF AGRICULTURE, LONDON.
Experiments in Horticulture in Progress at Experimental Horticulture Stations, October, 1958-September, 1959, 1959, pp. 135.

A tabulated list of N.A.A.S. projects showing crop, type and object of study, location and duration of experiment, and treatments and varieties listed.

3064. MINISTRY OF AGRICULTURE, LONDON.
N.A.A.S. Regional Experiments in Horticulture. Summary of Experiments in Progress October, 1958-September, 1959, 1959, pp. 55.

Tabulated data on crop, kind of study, purpose, region and number of centres, duration, treatment and/or varieties.

3065. NEW ZEALAND, D.S.I.R.
Report of the Department of Scientific and Industrial Research for the year ended 31 March 1959, Wellington, 1959, pp. 112, 4s.

The Secretary's Report briefly summarizes the year's progress including the following: *Growth of apple tissue in sterile culture* has been achieved in connexion with studies to improve keeping quality by stimulating cell division. *Appleby orchard experiments:* Trees on a poor clay soil were still yielding 3 bu. of apples after 26 years without added fertilizer. Top-dressed with NPK yields were nearly doubled, but, used singly, only N produced a response; the increased crops stored well if all 3 minerals were used but not when N was used alone. *New apple rootstock:* MM.793 is now being grown in quantity after successful trials, especially for poorer soils. *Virus diseases of fruit trees:* Mild strains of apple mosaic give trees good protection against severe strains. Other viruses are also being studied. *Ripe spot of apples:* Work on *Gloeosporium perennans* and *G. album. Carrot mottley dwarf virus:* The varieties Yates' Top Weight and Sweetcrop (Holmes' Improved selection) were field resistant. Chantenay, Early Nantes, Early Horn, and Manchester Table were susceptible. In early crops good control was obtained by fortnightly spraying with Metasystox from mid-October. *Freezing point of pears:* Studies of the freezing mechanism made to enable storage temperatures to be adjusted precisely. *Vegetable improvement:* Numerous improved varieties which have been released are listed. *Hop research:* Selection work and environmental studies. *Tobacco research station:* Stands of 7,000–8,000 plants per acre gave the best returns in yield trials. Tractor inter-cultivation tends to spread mosaic disease unless done with care to avoid the implement touching the leaves. *Manool: Dacrydium biforme*, a native tree, was found to contain at least 6% of manool resin, from which ambreinolid can be prepared. This substance, when oxidized, provides the characteristic odour of the essential oil of ambergris and is of considerable potential commercial importance. Short reports are also included from the various branches, including the Crop Research Division, Fruit Research Division, Hop Research Station and Tobacco Research Station, and grant-aided research in certain colleges and the Cawthron Institute is outlined.

3066. NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.
Calendar, 1959-60, pp. 125.

The best performers in variety trials were as follows: raspberries, Malling Jewel; black currants, Blacksmith; strawberries, Red Gauntlet; glasshouse tomatoes, Planet (Dutch light house); carrots, Ideal; early cabbage, Early Ironside; brussels sprouts, Cambridge No. 1.

3067. NORWAY.
Norges Landbruksvitenskapelige Forskningsråd, Årsmelding for budsjettåret 1958-59. **(Annual Report of the Agricultural Research Council of Norway for the year 1958-59.)** [English summary 7 pp.], 1959, pp. 121, bibl. pp. 7.

Soil sterilization by steam is among the subjects under investigation.

3068. NORWEGIAN NURSERY ASSOCIATION.
Årsskrift for planteskoledrift og dendrologi 1958. **(Yearbook for nursery management and dendrology),** Oslo, 1959, pp. 56, illus.

Brief articles on the following subjects are included: French roses, transplanting raspberries and a bibliography on *Malus.*

3069. ROYAL BOTANIC GARDENS, KEW.
Kew Bulletin. General Index to the Volumes for the years 1929-1956.
H.M.S.O., London, 1959, pp. 300, 30s.

A very useful and necessary companion to the Bulletin.

3070. SARAWAK (COOK, J.).
Annual Report of the Department of Agriculture for the year 1958, 1959, pp. 68, illus.

Investigations chiefly concern foot-rot of pepper caused by *Phytophthora* sp. An economic survey of pepper growing is in progress. Extension work deals largely with rubber.

3071. SOCIETY OF CHEMICAL INDUSTRY.
Reports on the Progress of Applied Chemistry, Vol. 43, 1958, 8½ × 5½ in., pp. 911, Soc. Chem. Ind., 14 Belgrave Square, London, S.W.1.

Topics reviewed include pot culture techniques, various aspects of plant nutrition, mechanisms of insect resistance to insecticides, essential oils, textural changes in fruit and vegetables at maturity and in storage, suitable stages of maturity for freezing vegetables, and changes in hop composition during ripening.

3072. SOUTH AUSTRALIA.
Report of the Minister of Agriculture, South Australia, for the year ended 30th June, 1958, Adelaide, 1959, pp. 76.

Horticultural industries: Acreage trends and production of the main fruit crops. *Major developments:* High citrus exports are reported owing to South Australia's freedom from fruit fly; apple crops have been good owing to improved cultural methods. *Horticultural research:* Work at Berri, Nuriootpa and Blackwood research stations is briefly described. *Fruit fly eradication:* The effective measures undertaken to keep the pest out are described.

3073. STEINHAUS, E. A., AND SMITH, R. F. (EDITORS).
Annual review of entomology, Vol. 5.
Annual Reviews Inc., Palo Alto, Calif., 1960, pp. 451, bibls, illus., $7.00 (U.S.A.) or $7.50 (elsewhere).

Among the 20 reviews the following are of direct horticultural interest: Biology of fruit flies, by L. D. Christenson and R. H. Foote (pp. 171–92, bibl. 62); The use of honey bees in the production of crops, by F. E. Todd and S. E. McGregor (pp. 265-78, bibl. 71); and Citrus insects and mites, by L. R. Jeppson and G. E. Carman (pp. 353–78, bibl. 240).

3074. SUDAN.
Annual Report of the Research Division, Sudan Ministry of Agriculture, 1953/54, 1956, pp. 235, [received 1959].

Including brief notes on pests of oil seeds and fruits, safflower and tobacco growing.

3075. UGANDA.
Annual Report of the Department of Agriculture for the year ended 31st December, 1958, 1959, pp. 75, illus., 5s.

Under the heading *Economic crops* coffee and tobacco growing are discussed with brief notes on tea, sugar, sisal and cacao. Under *Investigations annual and medium-term crops* progress reports are given of work on panama disease of bananas and a collection of banana clones. Sugar cane yields improved by approximately 28% following the heat treatment of setts taken from plants affected with ratoon stunting disease. Variety trials are in progress. *Perennial crops (Coffee Research Unit).* In large-scale trials dalapon proved successful for the control of *Digitaria scalarum* when applied twice at the rate of 5 lb./acre in 88 gal.; reinfestations were dealt with by spot treatment. Breeding of arabica and robusta coffee was continued. Pathological and entomological problems were studied, the latter in relation to sampling for *Antestiopsis*; malathion controlled this pest very well. Other aspects of coffee research concern physiology with special reference to bearing habits, agronomy including small-scale fertilizer and weeding trials, and processing.

3976. WASHINGTON STATE COLLEGE.
Washington Research Progress in Agriculture and Home Economics, Report No. 1, Agricultural Economics, May 1959, pp. 4.

Notes are given on a comparison of various consumer packs for apples; the economic value of grading carnations, pompon chrysanthemums and snapdragons; and factors affecting retail sales of peaches.

3077. WASHINGTON STATE COLLEGE.
Washington Research Progress in Agriculture and Home Economics, Report No. 3, Agronomy, May 1959, pp. 8.

Peach fruits are most sensitive to atmospheric fluorides during pit hardening; two sprays of 1 or 2 lb. of calcium chloride per 100 gal., at a fortnight's interval during early pit hardening, practically eliminated soft suture due to fluoride pollution. Anhydrous ammonia was found to be equivalent to ammonium nitrate as a fertilizer for apples. One test treatment of pea seeds with sodium molybdate, at ⅛ oz. per 100 lb. seed, doubled the concentration of Mo in the peas and increased vine growth by 16%; in another test the same treatment increased the concentration of Mo 6-fold but did not improve vegetative growth. The responses of apple, pear and peach trees and vines to various herbicides are briefly reported. Tests with new herbicides for the control of perennial weeds are summarized.

3078. WASHINGTON STATE COLLEGE.
Washington Research Progress in Agriculture and Home Economics, Report No. 6, Entomology, May 1959, pp. 3.

Brief notes are given on the control of various pests of apples, stone fruits and vegetables. Parathion continued to give best control of cherry fruit fly. Kelthane was most satisfactory against mites on peppermint.

3079. WASHINGTON STATE COLLEGE.
Washington Research Progress in Agriculture and Home Economics, Report No. 9, Horticulture, May 1959, pp. 8.

Work is summarized on the following subjects: Pea varieties; bean varieties, fertilizers and weed control; broccoli varieties, fertilizers, and direct sowing; lettuce, carrot and tomato varieties; strawberry varieties, soil fumigation, plastic mulching, weed control and plant density; raspberry varieties, cane populations, fertilizers; cranberry fruit setting and weed control; blueberry varieties; red currant varieties and plant spacing; grapevine varieties and cultural practices; blackberry varieties; cherry fruit cracking; chemical weed control in woody nursery stock and flower crops.

3080. WASHINGTON STATE COLLEGE.
Washington Research Progress in Agriculture and Home Economics, Report No. 10, Plant Pathology, May 1959, pp. 4.

Ridging proved to be an effective method of controlling red stele in strawberries, and in 2 experiments it increased yields by 21 and 55%. Sodium molybdate applied as a foliage spray to raspberries in the autumn increased early growth, yields and fruit size. Dinitro amine, applied to mint beds when the plants were 2 in. high, increased yields by 50%, reduced rust infection by 92·5% and controlled annual weeds. Onion seed treatment with BHC conferred a high degree of protection against smut, but commercial brands of BHC varied greatly in efficiency and phytotoxicity. For seed pelleting Anti-carie gave the best control of onion smut, and for furrow application Dyrene was the most promising fungicide. Dyrene was also best against cucumber leaf spot and broccoli downy mildew. Results of fungicide tests are briefly reported with regard to mildew on apples, pears and cherries, apple scab and bull's eye rot. Turf diseases studied were fusarium patch, red thread and fairy rings. Results are summarized on the control of bulb diseases and on the forcing of irises and tulips.

3081. WEST OF SCOTLAND AGRICULTURAL COLLEGE.
Farm and Experiments 1959, 1959, pp. 84.

Including brief notes on: tomato nutrition, and leaf-mould immunity in the hybrid *Lycopersicon peruvianum* × *L. esculentum*; chrysanthemum varieties; small fruit and plum variety trials; vegetable nutrition and variety trials; herbicide trials.

3082. WYE COLLEGE.
Report of the Principal to the Governing Body for the year 1957-58, 1959, pp. 70, illus.

Including notes on the activities of the Department of Horticulture.

3083. ZÜRICH-OERLIKON (SALZMANN, R.).
Tätigkeitsbericht der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon über das Jahr 1958. **(Annual Report of the Zürich-Oerlikon Agricultural Research Station for 1958.)**
Landw. Jb. Schweiz, 1959, **8**: 659-733.

Including notes on the control of diseases, pests and weeds in peas.